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## CONTENTS

| | PAGE |
|---|---|
| Editorials | 875 |
| Letters to the Editor | 880 |
| Publications Received | 882 |
| The Scrap Heap | 883 |
| Overseas Railway Affairs | 884 |
| The Summer Timetables of 193? | 888 |
| Power Signalling at Edinburgh, L.N.E.R. | 891 |
| New Southern Railway Warehouse at Nine Elms | 895 |
| Railway News Section | 897 |

### *OVERSEAS RAILWAYS*

SPECIAL NUMBER OF THE RAILWAY GAZETTE

*The annual Overseas Railways Number of "The Railway Gazette" will be issued next Wednesday. This number is additional to the ordinary weekly issue and will be sent to all regular subscribers. Extra copies, price 2s., may be obtained through any newsagent, or direct from the Publisher, post free, 2s. 6d.*

### *DIESEL RAILWAY TRACTION*

*A Supplement illustrating and describing developments in Diesel Railway Traction is presented with each copy of this week's issue.*

## Railway Freight Rebates Bill

TO straighten out the position of the railway freight rebates fund in view of the great reduction in railway rating assessments the Government has introduced the Railway Freight Rebates Bill which was read a first time in the House of Lords on November 17, and was given a second reading on Tuesday, November 24. Under the Bill the debt of some £9,750,000 from the fund to the railway companies is proposed to be met by the issue of stock by the Railway Clearing House, to be repaid over a period of 16 years. It is proposed also that there should be a temporary reduction in the list of selected traffics for rebate, so that the sums available for rebates should be concentrated on the traffics which would, in the opinion of the industries concerned, be most helpful to them. These traffics include export coal, coke, and patent fuel, which would benefit to the extent of 80 per cent., and milk and livestock would receive the remaining 20 per cent. The iron and steel industry, which is comparatively flourishing, will have temporarily to forgo its share of the rebates. It is anticipated that there will be sufficient in the fund to allow of rebates on export coal, coke, and patent fuel of about 5½d. a ton on the average, as against the existing average of about 8d. a ton. Milk and livestock rebates are estimated to be only slightly less than the present scale, which is 15 per cent. of the carriage charges. The Bill was to be in Committee of the Whole House yesterday. Meanwhile the Railway Rates Tribunal has decided to continue the existing scale of rebates.

* * * *

## The Week's Traffics

For the past week the traffics of the four group companies show a net increase of only £22,000 in comparison with the corresponding week of 1935, caused entirely by the drop in coal. In the 1935 week with which comparison is made there were the following coal traffic increases over 1934:—L.M.S.R. £14,000, L.N.E.R. £11,000, Great Western £9,000, and Southern £1,500, when there were large consignments owing to fears of a coal strike. The accompanying table shows the position to date of the four companies in comparison with the 47 weeks of 1934 (000's omitted):—

| | 1936 Pass., &c. | 1934 Pass., &c. | 1936 Goods, &c. | 1934 Goods, &c. | 1936 Coal, &c. | 1934 Coal, &c. |
|---|---|---|---|---|---|---|
| | £ | £ | £ | £ | £ | £ |
| L.M.S.R. .. | 23,429 | 22,436 | 22,533 | 21,023 | 11,249 | 10,684 |
| L.N.E.R. .. | 15,247 | 14,599 | 15,334 | 14,824 | 10,901 | 10,664 |
| G.W.R. .. | 9,879 | 9,532 | 8,994 | 8,465 | 4,717 | 4,680 |
| S.R. .. .. | 14,496 | 13,752 | 2,956 | 3,051 | 1,442 | 1,435 |

It will be seen that every class of traffic shows an improvement on 1934 except Southern goods. In comparison with 1935 the 1936 traffics to date show an aggregate increase of £4,427,000, or 3·24 per cent. Passenger train percentage increases are: L.M.S.R. 2·57, L.N.E.R. 2·14, Great Western 2·03, and Southern 2·08. Percentage increases in merchandise are: L.M.S.R. 5·87, L.N.E.R. 3.40, and Great Western 4·27.

| | 47th Week | | | | Year to date | |
|---|---|---|---|---|---|---|
| | Pass., &c. | Goods, &c. | Coal, &c. | Total | Inc. or Dec. | |
| | £ | £ | £ | £ | £ | % |
| L.M.S.R. .. | + 14,000 | + 28,000 | − 23,000 | + 19,000 | + 2,217,000 | + 4·03 |
| L.N.E.R. .. | + 2,000 | — | − 19,000 | − 17,000 | + 1,228,000 | + 3·05 |
| G.W.R. .. | + 8,000 | + 11,000 | − 9,000 | + 10,000 | + 600,000 | + 2·61 |
| S.R. .. .. | + 16,000 | — | − 6,000 | + 10,000 | + 382,000 | + 2·06 |

London Transport receipts for the past week show an increase of £25,700, and for the 21 weeks an increase of £356,500.

* * * *

## John Loudon McAdam

A few men have contributed their names to the language as ordinary words, and still fewer have achieved that distinction during their lifetime. John Loudon McAdam —the great pioneer of road construction—is among the select few in the latter category, for, whereas the centenary of his death (on November 26, 1836) fell yesterday, more than 112 years have passed since *The Times* of October 8, 1824, announced that "yesterday the workmen began to macadamize the wide roadway from Charing Cross to Parliament Street." McAdam's work had a profound effect on the industrial development of Great Britain, and, although he took no part in railway building, and was, in fact, not a friend to the introduction of rail transport, his personal views on that matter were of little account. On the other hand, his successful advocacy of good transport routes, and his practical and widespread adoption of well-drained, slightly raised roads of broken stones, were all to the good of transport in general and doubtless had a considerable influence on early railway permanent way methods. McAdam was the subject of "A new

ballad for the year 1825," and when a new stanza was added on January 24, 1836, it said:—

> But now Macadam's reign is o'er
> And railways take his place
> An fourteen miles an hour and more
> Is deem'd a snail's foot-pace

In the narrow sense this was true, but a century of further enlightenment has shown that progress in transport is never complete, and that even now we are indebted to the work of McAdam and the other pioneers of the industrial revolution period.

* * * *

## Timetable Dreams

Looking into the future is an engrossing occupation. Many of us, no doubt, have in moments of idle abstraction built up imaginary future timetables, of which the outstanding features have probably been trains more distinguished by spectacular speeds than by the practicability of their operation. But the visionary who on page 888 of this issue "reviews" the British timetable changes of a year yet to come—and which, so far as the speed of present timetable developments may indicate, appears still to be a considerable distance ahead—has ordered his visions with a remarkable sense of what is not merely practical and of public utility, but what, with present-day locomotive power, is in large measure immediately possible. The distinguishing features of his prognostications are not so much ultra-high-speed services of the Silver Jubilee type, but rather a general levelling-up of speed throughout Great Britain to a common standard, relatively to the grading and general difficulty of each route, and the institution, wherever possible, of services at systematic hours between the great centres of population. The proposals which are thus, in imagination, carried into effect involve extensive timetable reconstruction; and as we have from time to time urged in these columns, the public benefit that would derive from such reconstruction—*vide* the example of Germany—should well justify the trouble and cost involved. We would add that the article in question was written prior to the recent L.M.S.R. London-Glasgow trial runs.

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## The Beit Railway Trust

The late Alfred Beit, who died in 1906, left a sum of £1,200,000 for the furtherance of railways and other means of transport and communication in Rhodesia and other parts of Africa, including the Cape to Cairo railway, the great dream of Beit's close friend, Cecil Rhodes. In making the bequest, Mr. Beit, who was a native of Hamburg and became a naturalised British subject, empowered his trustees to accumulate surplus income for the duration of the period allowed by law. By means of these accumulations, and judicious investments, the fund now stands at about £2,700,000, despite liberal advances to various railways and public authorities. The present trustees are the Duke of Abercorn, Sir Henry Birchenough, Sir Alfred Beit, Sir John Chancellor, Sir James McDonald, and Baron Frederic d'Erlanger. Within the 30 years which have elapsed since Mr. Beit's death, the trustees have purchased engines and rolling stock to the value of £2,379,000 for resale on hire-purchase terms to railways in Rhodesia and Portuguese East Africa, and at a cost of £643,000 they built the 189-mile extension of the railway to Fort Victoria. A subsidy was granted for the prolongation of the line in the Sinoia district to benefit the agricultural industry, and support was given to the construction of the Birchenough and Limpopo bridges. In addition, the construction of 95 small bridges in Rhodesia has been financed, and the development of civil aviation has been fostered.

## Railways' Increasing Duties to the Passenger

When railways first came into being their aim was to provide nothing more than transport. Like the mail-coach passenger, the railway traveller had to take his own rug and footwarmer in winter, and to subsist during a long journey on home-prepared sandwiches, or on the fare obtainable, during stops, from wayside caterers. Today it is the aim of railway companies to provide comfortable transport, and, besides affording steam heating and lavatory accommodation, the modern long-distance train affords opportunities for eating and drinking out of its own larders and kitchens. Where the duties of the passenger carrier end is now uncertain. In America it is being argued that, as a man consumes about ten pounds of air for every pound of food he eats, the provision on a train of properly conditioned air should rank as important as, if not more important than, the provision of facilities of solid and liquid refreshment. It is pointed out that diseases of the digestive and alimentary system have almost disappeared as a result of the care taken to ensure the purity and freshness of food, but that diseases of the respiratory system, being mainly due to causes which are not receiving adequate attention, have come into special prominence. Railway passengers no longer heave and groan as the result of hasty or injudicious eating, but they continue to snuffle and sneeze and be overtaken with asthmatic seizures, particularly during the hay fever seasons, and the remedy for all this is air conditioning—particularly the exclusion by filtration of all irritating foreign bodies.

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## A Minor Railway Maintenance Problem

In one of the series of articles which we published recently in THE RAILWAY GAZETTE on "Railway Maintenance Problems" the author instanced the case of dock walls which, under the increasing loads of motor vehicles they had not been originally designed to withstand, gradually tilt outwards or move forward bodily. Colonel Hull's remedy was not to take down and rebuild the wall if it had not gone so far as to become foul of gauge, but to ease the load upon it by constructing a reinforced concrete roadway in replacement of the old metalled road, the slab of concrete being supported on benching formed at the top of the back of the wall. Since the publication of Colonel Hull's articles in book form there has been some correspondence in which his statement has been queried that this process costs little more than pulling down the original wall and rebuilding it of greater thickness. If, it has been said, Colonel Hull's remedy leaves the wall out of plumb and actually costs as much as or even more than pulling it down and rebuilding, where is the advantage? The answer is that estimates of costs in this sort of work must depend a good deal on local circumstances, that Colonel Hull's method provides a permanent concrete roadway, and, perhaps most important of all, it obviates the necessity for occupying the track alongside the dock while the work is being carried out.

* * * *

## A.T.C. and Accidents in Brazil

According to *Brazil-Ferro-Carril* a lively discussion has arisen in that country on the subject of automatic train control, and the merits, from the patent point of view, of a system stated to have been devised by a Brazilian engineer. It would appear that anxiety has been created of late by the increasing number of accidents, particularly on one well-known line, which, it is asserted, reveal a bad state of discipline among the staff, and the inadequacy of the signalling arrangements. Of course, if there are no automatic train stops and drivers are careless in their observation of signals, accidents are bound to result, but

we should say that—useful as automatic train control may be—the working of any line can never be satisfactory if the general discipline is as bad as this report would imply. Such a state of affairs cannot be confined to the drivers, and must almost certainly be apparent among the other grades too. As a result, maintenance of the equipment will not be carried out as it should be, a condition which must react unfavourably on even the best signalling apparatus. We know nothing of the Brazilian tram stop device, to which a patent appears to have been refused, but, whatever its merits, we venture to say that if anyone believes it will solve the accident problem while irresponsibility pervades the staff, he is destined to be undeceived.

* * * *

**High Speed in Italy**

The first of the Italian high-speed diesel-driven motor trains are now at work, and of the services that they provide the most spectacular is that between Milan and Venice, which covers the 165·9 miles each way non-stop in 2 hr. 40 min., at an average of 62·2 m.p.h. As the two steam-hauled *rapidi* which previously worked over this route have been withdrawn, the fastest ordinary steam service is the Orient Express, taking 3 hr. 35 min. eastbound and 3 hr. 47 min. westbound; the ordinary fast trains take slightly under 4 hr., so that the gain in time by the new service, which is confined to first and second class passengers, is considerable. Other new fast motor services are based on Bologna, where they connect with the principal expresses between Bologna, Florence, and Rome. Of these one runs daily from Trieste to Venice and Bologna and back, covering the 197 miles in 3¾ hr., including 15 min. in Venice and stops at Padua and Ferrara. Another service runs between Venice and Bologna only, making two fast trips in each direction daily over this 99½ miles in 105 min., two or three intermediate stops included, so that mile-a-minute runs between stops are necessary. The fourth of these services is one which leaves Bolzano at 10.45 a.m., covering the 162 miles to Bologna in 2 hr. 59 min., with stops at Trento, Rovereto, and Verona, and returning at 7.53 p.m. on a run in the same time to Bolzano. All include restaurant car accommodation, and are considerably faster than anything previously attempted over the same routes, except the short-lived steam schedules of 2 hr. 48 min. and 2 hr. 51 min., between Milan and Venice several years ago.

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**Illustrating the Rule Book**

When something occurs on a railway rendering it necessary to depart from the ordinary routine working, safety depends in great measure on the faithful observance of rules and regulations comparatively seldom applied, and which some members of the staff may have to execute only at long intervals. It is therefore desirable that steps be taken to keep the meaning of such rules before the mind, so that no time is lost and nothing left undone when they have to be obeyed. The Firemen and Enginemen's Mutual Improvement Class, G.W.R., has issued a neatly arranged chart with diagrams showing how to carry out the various clauses of Rules 180, 183, 184, 203, and 14, 18, General Appendix, covering wrong line movements in varying circumstances; opposite line obstructed; and breakdowns on the single line, with the duties of the staff concerned, where they must put down detonators, what forms they must fill up, and so on. Those who find it easier to recollect visual than verbal impressions should find the chart helpful. Such diagrams are very common in Continental rule books. "Detonators," the chart states, "will stop the fastest train on earth." Valuable as they are, our opinion of their ability to attract attention is not so high as that. There was once, however, an automatic train control system tried on the L.S.W.R. in which a detonator exploding set a cab signal at "danger" on the engine and applied the brakes, constituting what was termed a "portable train stop."

* * * *

**Maximum Locomotive Horsepower**

What is the actual maximum horsepower ever developed by a steam locomotive must remain conjecture, but it is probable that so far as useful work is concerned the 6,300 drawbar horsepower recorded with the new Norfolk & Western Railroad 2-6-6-4 express Mallets has not been exceeded. This output was attained at 45 m.p.h., a high speed for an articulated locomotive of this type, and it is unlikely that more than 80 per cent. of the cylinder horsepower was available at the drawbar. But assuming a ratio of 82 per cent. this gives an indicated horsepower of 7,700, and as the locomotive ran full out at speeds up to 63 m.p.h., but with the drawbar output decreasing after 45 m.p.h., it is probable that a figure of 8,000 i.h.p. was reached. The locomotive alone weighs 254 English tons, giving ratios of 24·75 d.b.h.p. and 31·5 i.h.p. per ton of locomotive weight. On a continuous basis the maximum drawbar figure was about 23 h.p. per ton. These values, obtained with a four-cylinder simple engine with 5 ft. 10 in. coupled wheels and a boiler pressure of 275 lb. per sq. in., cannot compare with those obtained from the four-cylinder compound 4-8-0 engines of the P.O.-Midi Railway, which have 5 ft. 11 in. wheels and 290 lb. boiler pressure. The French engines, scaling 105 English tons, have attained a peak of 39·7 i.h.p. per ton and 31 d.b.h.p. per ton, the continuous drawbar capacity being no less than 28 h.p. per ton, but of course it is notoriously more difficult to get the same specific power output and efficiencies with machines of the size found on American railways.

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**Heat-Treated Tyres**

Among the numerous mechanical engineering reports read and discussed at the fifteenth annual meeting of the Mechanical Division of the Association of American Railways held in June last was one of great interest on the subject of heat-treated tyres, the application of which is still in a state of developments on the American railways. More recently several railways have applied heat-treated locomotive driving tyres having physical properties similar to those of trailing wheel tyres, in the hope of securing greater mileage between turnings. In many cases satisfactory results have been obtained, but there is considerable evidence to the effect that with heat treatment giving a high degree of hardness, it is important that the tyre shall be fully and uniformly supported by the rim of the wheel. If the support given to the tyre is not uniform because of distortion of the wheel centre, improper shimming or other causes, the tyre is subject to flexure at the unsupported points, whilst, in addition, the bore of the tyre at these points may be subject to corrosion, which greatly reduces the fatigue strength of the tyre section. A tyre of low elastic limit may distort permanently and adapt itself to the contour of the centre, whilst a treated tyre of higher elastic limit may be subject to continued flexure leading to failure. A considerable number of the failures in heat-treated systems are attributed to this cause. Incidentally it was remarked during the discussion that of tyre failures on one class of locomotive, 93 per cent. occurred on the left side, and it was suggested that on a double track railway the inside rail, on which the left hand wheels run, is less flexible than the outside rail. This, however, does not apply to heat-treated tyres.

## The Restoration of Prosperity to South Wales

REFERENCE was made in these columns in July to the circumstances in which the South Wales Trade Recovery & Expansion Committee was formed, under the chairmanship of Sir Robert Horne, to investigate all existing or new schemes designed to assist the resuscitation of industry and, in particular, to indicate to the Government measures which, in the opinion of the committee, should be taken by the Government if the present situation is to be alleviated. The committee comprises the leading industrialists of South Wales, and to facilitate their work sub-committees were constituted to investigate various aspects of the problem. In view of its urgency, the work of the coal sub-committee was pressed forward and a report was submitted to the President of the Board of Trade at the end of July. Subsequently, a deputation from the committee discussed various matters with the President, and a supplementary report was submitted to him on September 25. After completion of enquiries by the shipping sub-committee, a comprehensive memorandum covering the South Wales coal and shipping industries was forwarded on November 15 to the Prime Minister and other members of the Government. This outlined the main features of the general situation in South Wales and Monmouthshire, stressed the urgent necessity for Government assistance, and emphasised the view that there could be no solution to the problem of restoring prosperity to South Wales other than a revival of the coal export trade.

Figures were given showing that South Wales had suffered a wholly disproportionate loss of the coal export trade compared with other exporting districts of the United Kingdom. The shipments for the current year to the end of September were 9,812,000 tons, or 45·9 per cent. less than in the corresponding period of 1929, and as this decline represents a loss of direct employment to about 39,000 men, and of indirect employment, to about 25,000 men, the committee views the present position of the South Wales coal export trade with the gravest apprehension. The decline in coal shipments is attributed to the effects of subsidised foreign competition by Germany and Russia, and to barter and blocked credit transactions. The industry is helpless in such circumstances, and the loss of further markets is inevitable unless the Government takes action. In the opinion of the committee, the problem can be solved only by the formation of a European coal cartel, which can be achieved only by the Government clearly indicating its intention of taking every possible step to regain for Great Britain its fair share of the world's coal export trade, and by placing at the disposal of the industry a temporary subsidy sufficient to enable it to secure the formation of such a cartel. The committee has also made other representations of a more detailed character relating to the recent displacement of Welsh coal in Canada by the importation of Russian anthracite; the importation of foreign coke into England when Welsh coal is capable of fulfilling all the functions for which this coke is required; the unification of royalties, and the desirability of the Admiralty making use of existing dry docks and ship-repair works in South Wales.

The committee also pointed out that the South Wales shipping industry has suffered equally with the coal trade from the loss of foreign markets, in addition to which foreign vessels have been competing to an increasing extent with British ships. The reaction on the employment of British seamen, shore labour, and industries directly associated with shipping at South Wales ports has been extremely serious. With a view to an amelioration of the position, the committee urged that British shipping should receive preference of employment for the conveyance of British goods, while detailed recommendations were also made in regard to the coastal trade, future trading agreements, and international shipping conventions. In order to stimulate the use of South Wales coal, the committee also stressed that the Ministry of Transport regulations should be amended so as to place steam road vehicles on a basis of equality of pay-load with petrol and diesel vehicles so as to provide an inducement to the development and use of road vehicles propelled by compressed gas or suction gas generated on the vehicle itself. The establishment of Government depots in South Wales will bring some relief of unemployment, but the committee is closely following up numerous and varied proposals for the establishment of new industries, and is co-operating with the trading estates and the Special Areas Reconstruction Association Limited. It is understood that the Government is now giving careful consideration to the proposals put forward by the committee.

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## Beira and Mashonaland and Rhodesia Railways

A TOTAL length of 2,708 miles on the 3 ft. 6 in. gauge is included in this system, of which 197½ miles are in Moçambique (Portuguese) Territory. Though belonging to four separate companies, namely, the Mashonaland Railway Co. Ltd., the Rhodesia Railways Limited, the Beira Railway Co. Ltd., and the Shabani Railway Co. Ltd., the railways are worked as to 2,119 miles by one administration, and the 589 miles extending from Vryburg to Bulawayo, including the Matopos branch, are operated by the South African Railways. Bulawayo is the effective centre of the system, from which railways extend to the border of the Belgian Congo on the north, to Bechuanaland on the south, and to the port of Beira on the east. According to the report for the financial year ended September 30, 1935, which we have received from Mr. H. Chapman, C.B.E., the General Manager, favourable trade conditions continued during the year under review. That the increase in working expenditure was only 5·8 per cent. when the increase in earnings was 17 per cent., the increase in tonnage 21 per cent., and the increase in train-mileage 16·7 per cent., indicates efficient and economical operation. Passenger traffic continued to show encouraging signs of revival, and there was an improvement in native passenger traffic. Revenue from general goods traffic was greater by £345,987, or 18·1 per cent., and that from the more important mineral traffics (coal and coke, copper for export, chrome ore and asbestos) by £264,083, or 20·9 per cent. The accompanying table compares some operating figures:—

| | 1934-35 | 1933-34 |
|---|---|---|
| Passengers .. .. .. | 696,439 | 624,519 |
| Total tonnage .. .. .. | 2,292,388 | 1,894,643 |
| Operating ratio, per cent. .. | 57·57 | 63·66 |
| Train-miles .. .. .. | 4,980,596 | 4,268,656 |
| | £ | £ |
| Passenger receipts .. .. | 338,787 | 314,953 |
| Goods and mineral receipts (excluding departmental) .. | 3,909,780 | 3,299,105 |
| Gross earnings .. .. | 4,558,632 | 3,895,490 |
| Gross operating expenses .. | 2,624,278 | 2,479,748 |
| Net earnings .. .. .. | 1,934,354 | 1,415,742 |

Expenditure on way and works remained at much the same level as in the previous year. There was an increase of £17,095, or 7·9 per cent., in expenditure on maintenance

of locomotives, which is mainly accounted for by heavy repairs to engines working on the Vryburg—Bulawayo section, and also to the reversion to full time in the workshops at Bulawayo, Umtali, and at the various depots. Consequent upon the appreciable increase in the wagon mileage and the longer working hours of the staff, there was an increase of £15,683, or 16·4 per cent., in expenditure on wagon maintenance. The additional expenditure of £50,597, or 11·8 per cent., in locomotive running compares with an increase of 845,327, or 16·8 per cent., in engine mileage, and is accounted for by the larger fuel requirements, additional staff, and the restoration of the balance of the temporary pay deductions. There was an increase of £26,825, or 11·8 per cent., in traffic running expenses, accounted for by additional staff, restoration of the balance of temporary pay deductions, and the purchase of a larger number of tarpaulins. The motor trolley gang system of maintenance was introduced on the Gwelo—Fort Victoria branch in September, 1934, and on the Selukwe branch a few months earlier. In view of the favourable results obtained, the extension of the system to other branch lines is being considered.

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## Signalling at Waverley Station

WAVERLEY station, Edinburgh, the principal station of the old North British Railway is one of the largest not only on the L.N.E.R., but in Great Britain, and is the converging point of a number of important main line routes. Opened in 1893 in connection with widenings in the vicinity, it has fifteen bay platforms, three of which have middle roads between them, four through platform lines, two through loops and some carriage sidings. The extent of the layout and the numerous points and crossings necessary to provide the facilities required by the operating department called for the use of several signal cabins. Two large ones were provided at the East and West ends of the station, containing 260 and 205 levers respectively. For some time the former held the record for the number of levers in one continuous row. Two relatively small cabins, the North Central and South Central, were provided in the centre of the station to work double crossovers by which trains could be passed between the loop and platform lines, and forming an intermediate signalling point to divide the long through station tracks. The control between these cabins was necessarily extensive and there was a large amount of mechanical slotting, while the number of signals was also considerable, there being some 40 arms on the East signal bridge alone. The frequent shunting movements were very fully covered by shunt signals and this still further increased the cumbersomeness of the mechanical signalling equipment, which, of course, was all that was available at that time. Beyond the Mound tunnels to the West were double junctions worked from Princes Street Gardens cabin. For some years the Sykes block was in operation from that point through the next tunnels to Haymarket station and it was later put in to protect the sections through the Calton tunnels between Waverley East and Abbeyhill Junction, while a certain amount of track circuiting and some electric reversers were also installed.

The shunting at the West end of the station, involving a certain amount of wrong line movement towards Princes Street Gardens, called for special methods of working also. These were complicated by the tunnels, into which most of the shunts had to be made. Signalmen, enginemen and shunters acquired considerable skill in these shunting movements. The working of the station somewhat resembles that of certain Continental stations, where trains have to be split up and re-formed to new destinations. Expresses from the South are divided to run to three or four Northern and Western destinations, and similarly in the reverse direction, several sets of vehicles are formed to make an express to the South. Reversible working is in operation on the four through lines, which, in combination with the facing road working presented problems not met with in normal terminal station arrangements. The track layout was expressly designed to accommodate this transfer work, in which the central crossovers are much used. Three fourths of the traffic is dealt with between 8 a.m. and 10 p.m., and over 500 train movements, inclusive of empties and light engines, have been dealt with at the West end of the station on certain days, in addition to shunting movements, which in themselves are intensive. The increase in the length of trains has necessitated lengthening two of the platforms, which it is proposed to do as soon as the old West box, now superseded by the installation described in this issue, is demolished. When the summer traffic is at its height some of the Edinburgh-Aberdeen trains extend to a length of 1,000 ft., and weigh 550 tons.

The fact that much of the old signal equipment was overdue for renewal led to the whole question of signalling in and near the station being reviewed and it was decided to adopt power working, with a new box at Waverley West to replace the one there and to cover the area from the old Central boxes through the two sets of tunnels to Haymarket East, so that all those boxes and Princes Street Gardens could be abolished, simplifying the working by concentrating it, and enabling substantial reductions in operating costs to be obtained. The work was brought into use on October 11 and it has now been decided to proceed with a similar scheme for Waverley East. Multiple-aspect signalling has been adopted, with banner shunt signals and a number of route indicators. Splitting signals (not junction indicators) are used for the Princes Street crossover junctions. The layout is, of course, completely track circuited, and there are electric fouling bars to supplement this at the bay buffer stops where the rails are apt to become very dirty. It is interesting to see that detonator placers are being used for the signals controlling the ends of the Haymarket tunnels, where any over-running might lead to serious consequences. Study of the diagram accompanying the article on page 891 will show that the new signalling is well arranged to meet the somewhat peculiar layout, and represents another step in the adoption of power working at the largest stations in this country, which has been going steadily forward in recent years.

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## Railway Telephones

DR. ALEXANDER GRAHAM BELL, the famous scientist, who was a native of Edinburgh, is generally regarded as the inventor of the telephone in its first really practical form. Italy, it is true, claims that one of her citizens living in America, Antonio Meucci, had arrived at the same idea some years earlier, while a Frenchman, Charles Bourseul, and a German, Philip Reis, had also pursued the subject. The last-named succeeded in transmitting sounds, though apparently not articulate speech. Samples of Bell's instruments were brought to England in 1877, by the late Sir William Preece, later Engineer in Chief to the Post Office, and exhibited by him, in company with the inventor, before the British Association at Plymouth. On January 14, 1878, Bell and his agent, Colonel Reynolds, were received by Queen Victoria at Osborne House, Isle of Wight, and demonstrated the apparatus, Her Majesty conversing with Sir Thomas

Biddulph at Osborne Cottage, while Sir William Preece spoke from Southampton. An organ played in London was also distinctly heard. Later Bell presented a specially finished set of instruments to the Queen. On June 14 the first telephone company in Great Britain was floated to work Bell's patents, and the first exchange was opened in August, 1879, at Coleman Street, in the City of London, serving seven or eight subscribers, among them James Staats Forbes, Chairman of the London Chatham & Dover Railway. A further—and very considerable—impetus had by then been given to electric transmission of speech by the invention of the microphone in 1878 by David Hughes, a native of London, who passed his early life in the United States, and whose type-printing telegraph became very well known. He did not patent the device; had he done so the history of telephony would have been very different.

The manifest advantages afforded by the ability to transmit speech over considerable distances soon led to a remarkable extension of the telephone industry, which has continued ever since. Railways were not slow to appreciate what the invention meant to them, and in his instructive work issued in the early nineties, "The Application of Electricity to Railway Working," the late W. E. Langdon, then Telegraph Engineer to the old Midland Railway, was able to write that probably no other electrical device, apart from block instruments, had proved of greater service in aiding the working of railways than the telephone, and that the main lines of most of the leading railways were fully equipped, enabling the signalmen throughout the route to speak to the neighbouring boxes. In addition to this type of communication, other circuits were gradually provided and extensive telephone systems have since appeared on all the lines, between headquarters and district offices, between the latter themselves, and in many other directions. In his paper before the Institution of Railway Signal Engineers on November 25, "How Telephones Help to Work Railways," Mr. W. E. Green dealt with the historical and practical side of railway telephony from the operating point of view and showed how great were the services rendered by engineers to those responsible for working the traffic, as exemplified, for instance, in the facilities afforded by traffic control and despatching systems, where the telephone was now indispensable and was saving the railways large sums of money annually.

The telephone, like every other device, has its disadvantages. This was emphasised by Langdon in the work above mentioned. "Words uttered by it," he said, "are liable to be misunderstood. Much depends upon the voice of the speaker and experience in the use of the instrument." Several accidents have, of course, resulted—partly at all events—from misunderstandings created by careless speaking over the telephone, but this danger is one to be removed by discipline and training, as in many other cases. Remarkable as are the benefits of the telephone, enabling it to supersede the telegraph for many purposes, the latter, as Mr. Green remarked, has its own extensive field of utility. The telephone is no substitute for the modern high-speed printing telegraph, with the wonderful multiplex working now available whereby several messages can be sent simultaneously, as fast as anyone can work a typewriter keyboard, over one line, and be printed with perfect accuracy by the respective receiving instruments. Telegraphy in this form, if no other, fills a place which no non-recording device like a telephone can, and, as we see it, both telegraphs and telephones are destined to continue side by side, each contributing in its own way to the increased efficiency and economy of railway operation.

# LETTERS TO THE EDITOR

*(The Editor is not responsible for the opinions of correspondents)*

## Streamlining for High Speed

Meliden, Ravensworth Coach Road,
Gateshead-on-Tyne
November 23

To the Editor of The Railway Gazette

Sir,—In your editorial comment upon the excellent performances of the L.M.S.R. trial train, which ran recently from London to Glasgow and back in less than six hours each way, you mention that the L.M.S.R. authorities stress the point that these speed tests were made by a standard locomotive and a train of ordinary stock without any assistance from streamlining, and that they imply that streamlining is unnecessary for high-speed running. It would be interesting to know the reason for this policy, unless of course it is dictated merely by the desire that the L.M.S.R. shall not appear publicly as a slavish follower of the L.N.E.R. in all that pertains to high speed. After all, who doubted that an L.M.S. Pacific was sufficiently powerful to put up the performance it did on the London—Glasgow route with trains of 225 to 260 tons weight composed of ordinary stock?

Much of the present streamlining of low-speed road and railway vehicles is admittedly meretricious, and whilst streamlining is not in fact essential for speeds up to 90 m.p.h., or thereabouts, nevertheless as speed rises some form of part streamlining becomes first of all desirable on the grounds of economy, and finally an absolute necessity. The illustration which you publish of the down trial train passing King's Langley at 80 m.p.h. points an obvious moral if the camera is not lying particularly badly upon this occasion; what seems to be a partial vacuum appears just above the front of the dynamometer car, caused apparently by the gap between the cutaway end of the tender and the full-fronted bluff end of the ex-Lancashire and Yorkshire dynamometer car, whilst even the blast appears to occupy the back half only of the space immediately above the chimney!

It seems a pity, when part streamlining of locomotives and stock can be had for little or no extra capital cost, that advantage should not be taken of this facility in new construction, regard being had to the fact that an average speed of 70 m.p.h. by no means represents the limit of speed that may be reached on railways.

Yours faithfully,

A. H. EARLEY

## The Glasgow Flyer

56, St. Mary's Mansions, W.2
November 21

To the Editor of The Railway Gazette

Sir,—I read with great interest your account of the excellent performance on the L.M.S.R. test runs on November 16 and 17. Test conditions, however, cannot always apply in actual practice, and, notwithstanding the evidence of last week's runs, a 6-hr. schedule between Euston and Glasgow would give far less margin for unavoidable delays than a 6-hr. King's Cross and Edinburgh booking. Allowing for distance, gradients, and speed restrictions, 6¼ hr. is really an equivalent schedule for the L.M.S.R., and such an allowance, besides safeguarding punctuality at vital points en route, would admit of an intermediate stop, at Preston, to throw the service open to Lancashire and Glasgow passengers and enable a fresh engine to be used for the northern half

of the run. Apart from the importance of punctuality to the public (and late arrivals may well raise the question of a refund of the supplementary fare), the successful operation, among ordinary traffic, of trains like the Silver Jubilee and Bristolian depends on their strict adherence to schedule intermediately, and we hope, of course, that Glasgow will not be the only goal of L.M.S.R. high-speed trains. The business traffic between Liverpool and Manchester and London can hardly be given less generous treatment than has been promised by the L.N.E.R. to Leeds, and the glamour of a Glasgow Flyer ought not to cause less spectacular but badly needed alterations elsewhere—such as the revision of the services in Scotland and on the old Midland system so often advocated in your columns—to be postponed or overlooked.

Yours faithfully,

R. E. CHARLEWOOD

## The Silver Jubilee

London, November 19

To the Editor of The Railway Gazette

Sir,—One hears and reads a great deal nowadays about high-speed trains and in this country the L.N.E.R. Silver Jubilee gets a large amount of publicity. In all that has been said and published, however, I have never yet come across any statement explaining why six-coupled wheels of what may be termed "normal" diameter were selected in this case where the train is light and the schedule an essentially high speed one.

I should have thought a wheel arrangement incorporating four wheels coupled, either the 4-4-2 or 4-4-4 with wheels say 7 ft. dia. or larger, as is being done in the United States, Canada, and elsewhere, would have been preferable, and have shown to advantage in comparison with a design which for all intents and purposes, apart from the semi-streamlining, has been used by the L.N.E.R. for years past for hauling much heavier trains in accordance with much slower schedules.

Yours truly,

"ENQUIRER"

[The advantage of a six-wheeled coupled engine with wheels of the size used in the *Silver Link* type on the L.N.E.R. and for the service referred to, is that a high *average* speed can be maintained throughout, improved acceleration and grade climbing more than making up for any slight inferiority if it exists in maximum speed on level stretches and downhill. Improved adhesion is another factor, especially as the service is continued throughout the winter regardless of weather conditions.—Ed. *R.G.*]

## Double-Deck Railway Carriages

Bombay, October 16

To the Editor of The Railway Gazette

Sir,—I was greatly interested to see the references in your issue of July 31 last (page 178) to the use of double-deck railway carriages in various parts of the world, and the subsequent mention (August 7, page 216) of such vehicles on the Lahore-Amritsar section of the Punjab & Delhi Railway (now North Western Railway) 72 years ago. That would make the date 1864, and therefore not the earliest use of double-deck carriages in India, for my records show that what was described as the "new two-storied third class carriage" was first tried on the Bombay, Baroda & Central India Railway in the early part of 1862.

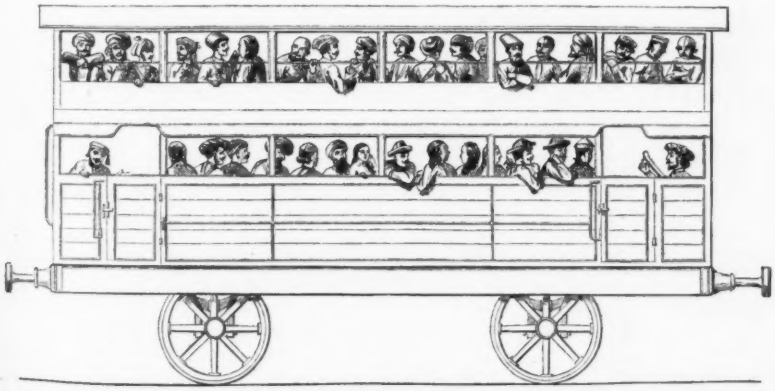
The illustration I enclose was published in March, 1864, and the accompanying description said that this type of carriage had been found most popular with the natives as well as economical for the company. It added:

> "These carriages, indeed, are usually better filled than the ordinary ones, for the passengers like them better. They are constructed each to carry 120 passengers—*viz.*, 70 in the lower story and 50 in the upper; whilst the ordinary carriages only carry 70 persons each. It may be observed, therefore, that seven of the two-storied carriages will convey the same number of passengers as twelve of the ordinary kind. The importance of this will be understood by railway managers, especially for the traffic of a country where large crowds have to be conveyed at once, and where more than 95 per cent. of the travellers are third-class passengers. By the mode of construction which has been adopted the weight and cost of the double carriage are less than of the ordinary carriage. The roof of the first story serves as the floor of the second. The seats are longitudinal instead of transverse, so that the sides of the carriage serve as backs to the seats; but there are also some seats down the centre. The two-story carriages stand about 21 in. higher than the one-story carriage. This, of course, would involve some increase of the atmospheric resistance; but, on the other hand, the train of two-story carriages is little more than half the length of an ordinary train; so that the aggregate amount of such resistance is much reduced. With regard to the stability of the train, it is to be remarked that the centre of gravity is placed very little higher than that of the ordinary train, since the real height of the substantial part of the carriage is but from the rail to the second floor, and not to the roof, which is but a light cover placed over the head of the upper-story passengers to protect them from sun and rain."

These carriages were first suggested by Lieut.-Col. J. P. Kennedy, but designed by Mr. G. N. Anderson, the company's Locomotive and Carriage Superintendent, and constructed at the railway works at Amrolee, near Surat.

Yours faithfully,

"PAREL"



*Double-deck B.B. & C.I. railway carriage of* 1864

## A Question of Spelling

91, Oakley Street, Chelsea,
London, S.W.3.
November 21

To the Editor of The Railway Gazette

Sir,—Can we not settle down to writing "coördinated" instead of the clumsy "co-ordinated"? In *The Economist's* "Bed and Breakfast" article, which you quoted in your Scrap Heap columns on September 25, I came across the word "unco-ordinated." I found myself wondering, for a minute, what on earth "ordinated" meant in that particular context. Because, of course, "unco" is perfectly good Scotch, and conveys a superlative. Therefore, "unco-ordinated" means "very ordinated," not "uncoördinated," and that, as far as I can see, means nothing at all. It's an unco important question.

Yours faithfully,

C. HAMILTON ELLIS

[We do not wish to take upon ourselves the responsibility of introducing accents into the English language, despite the "precedent" of recent United States practice. As we agree with our correspondent that "unco" is an unfortunate prefix, we prefer to avoid this form of word, and he is unlikely to have his more tender Scottish feelings outraged in our columns in this way.—Ed. *R.G.*]

# PUBLICATIONS RECEIVED

**Daily Mail Year Book, 1937.** London : Associated Newspapers Limited, Carmelite House, E.C.4. 7¼ in. × 4¾ in. 294 pp. Illustrated. Price 1s. 0d. net.—This is the 37th edition of this popular annual which, as the note on the cover justly claims, is " a handy reference book to all the questions of the day." In addition to information concerning almost every sphere of national, and to a certain extent international activity, there are included in these 294 pages a number of authoritative articles on matters of outstanding importance. Another useful feature is a " Who's Who " section containing some 1,000 biographies of eminent persons of this and other countries. A three-page article on British railways appears over the name of H. G. Archer, who summarises the outstanding events of the past twelve months. In addition, Sir Arnold Gridley, M.P., touches briefly on railway schemes in his article on " Electrification in Great Britain in 1936," and Sir Percy Hurd, M.P., pays attention to Canadian railway difficulties in his analysis of that dominion's problems. Home railway finance is dealt with by the City Editor of the *Daily Mail* in the money market article. A number of improvements in typography and a new-style cover are features of this year's edition, which should meet with general approval.

**John Loudon McAdam : Chapters in the History of Highways.** By Roy Devereux. London : Humphrey Milford, Oxford University Press, Amen House, Warwick Square, E.C.4. 9 in. × 5½ in. 184 pp. Illustrated. Price 7s. 6d. net.—The coincidence of two events makes this volume peculiarly appropriate and topical at the present time, namely, the centenary yesterday of the death (on November 26, 1836) of John Loudon McAdam, the great pioneer of road construction, and the presence of the Trunk Roads Bill in Parliament. McAdam was born at Ayr in 1756, and, being the tenth and youngest son of a family left comparatively impoverished in 1770, he emigrated to New York when but 14 years old. During the American War of Independence he is said to have made and lost considerable sums of money, but on his return to Scotland in 1783, enough remained to buy an estate, and thus he was enabled to follow his inclinations without being affected by penury, as were many pioneers. Military activities from 1794 onwards made him realise the urgent need for good roads, and thereafter his energies were directed to both the advocacy of his ideas and their practical application. An indication of his success is given by the fact that his name had been adopted into the ordinary language some twelve years *before* his death.

In McAdam's opinion the bad condition of roads then prevailing was due to misapplication of the materials, and his plan was to drain the road thoroughly from the sides, raise its level slightly, and build it entirely of broken stones, none exceeding 6 oz. in weight, to a thickness of about 10 in. He said : " A road ought to be considered as an artificial floor, forming a strong, smooth, and solid surface, at once capable of carrying great weight and over which carriages may pass without meeting any impediment. . . . Nothing is to be laid on the clean stone on pretence of binding. Broken stone will combine by its own angles into a smooth, solid surface." Much of this still has a familiar ring, and doubtless McAdam's influence on railway permanent way methods was not inconsiderable, although their author took no part in railway building and was, in fact, not a friend to the introduction of rail transport.

The present volume has the advantage of having as its author Mrs. Roy Devereux, a relation of McAdam who has had access to interesting family correspondence and documents. The result is therefore a collection of valuable material, but its style of presentation is less happy. The book lacks unity of structure, and this emphasises the omission of an index. As a literary work and a biography it therefore has rather severe limitations, but the authoress writes with enthusiasm and knowledge and we must be grateful to her for placing her material within the reach of all.

*Reference to John Loudon McAdam is made in an editorial note on page* 875.

**Copper and Bronze Welding of Tube and Sheet Copper for Piping Installations and Roof-Work.** By W. L. Kilburn. London : The British Oxygen Co. Ltd., Thames House, Millbank, S.W.1. 8¾ in. × 5½ in. 156 pp. Illustrated. Price 5s. net.—This work, although not directly dealing with welding operations as practised in railway shops, provides a great deal of information of value in that connection. It is written more especially for the benefit of heating and sanitary engineers and architects, and provides sufficient and reliable information on joining copper pipes and fittings in a variety of forms by means of both copper and bronze welds. For the welding of copper the high pressure oxy-acetylene system is strongly recommended by the author, and the equipment required is described and illustrated, together with operating instructions. Other sections deal with welding of copper sheets, pipe bending, the use of weldable fittings, soldered joints and several other matters of equal interest to those concerned in work of these descriptions. The eight chapters comprising the book are supplemented by six appendices setting out the physical and other properties of copper tubes and kindred subjects. Both the text and illustrations, of which latter there is an amplitude, are well arranged and clearly reproduced.

**Winter Holidays.**—Dean & Dawson Limited, 7, Blandford Square, London, N.W.1, send us a programme of winter holidays abroad, at home, and at sea. Very moderate inclusive rates for holidays in Europe have become familiar, but they are now extended to travel in the Near East. The prices of tours in Morocco, for example, start as low as £16 17s. 6d. for 15 days. Egypt is also brought within the scope of cheaper holiday travel. The home section of the booklet quotes inclusive charges, including third class return tickets for visits to the principal winter resorts, spas, and centres of interest. An eight-day tour in Jersey is offered at £7 19s. 6d. with air travel to and from London, or at somewhat cheaper rates by train and steamer.

**French Railway Literature.**—The French railways have combined in the publication of two artistically produced illustrated booklets (in English)—" The Spas of France " and " Pilgrimages of France." A very cursory glance at the former shows that the cure is by no means the chief attraction of a French spa. As the introductory letterpress says : " The question of amusement has always been considered by French spa authorities to be one of the elements which contribute to the success of a cure by creating around the patient an atmosphere favourable to his recovery . . . all the spas are so arranged that all sports can be indulged in, whilst the larger have golf courses and race-courses.

Let it not be thought, however, that the pleasant pages of this guide beckon only to frivolity. For the reader wishing to select his spa according to his complaint, there is a pictorial index in which an affable collection of human skeletons is seen quaffing the waters and deriving much benefit in the affected organisms. Perhaps the most striking feature of the other booklet, " Pilgrimages of France," taking for granted a high standard of production and interest, is the excellence of the photographic studies reproduced.

**Photogravure Printing Machinery.**—We have received from the printing machinery department of John Haddon & Co., incorporated practitioners in advertising, of Salisbury Square, Fleet Street, E.C.4, an illustrated booklet dealing with the range of high-speed Auto-Paramount detachable plate photogravure presses, one of which is being exhibited at the Printing Exhibition at Olympia. Photogravure is being increasingly used for the production of artistic travel literature, and opens up possibilities of colour printing in this field with economy of time and complication as compared with the lithographic process. Photogravure in colour will give results in three operations which lithography cannot equal or excel by seven or nine operations.

# THE SCRAP HEAP

"The well educated man must travel first," we read. But suppose he can only afford to travel third?

* * *

Dr. Friedrich Hettersdorf, of Munich, claims to have the largest and most comprehensive collection of transport tickets in Europe. In 45 years of collecting Dr Hettersdorf has secured 40,000 specimens from 5,000 transport enterprises in 100 different countries. His albums include tickets from trams, elevated, underground, and cogwheel railways, roller-coasters, suspension railways, cablecars, buses, motorboats, ferries, steamers, taxis, and rickshaws. He claims to have tickets from all countries in the world except Iceland, Corsica, Abyssinia, and the Gobi Desert, but hopes to add those to his collection soon.

* * *

A RUSSIAN POST-OFFICE CARRIAGE

In the department for railway carriages at the late St. Petersburg exhibition one of the most interesting objects was a mail carriage exhibited by the firm of Lilpof, Rau & Co., of Warsaw. It is a fine specimen of carriage building, and, considering that it is only recently that railway carriage building has been undertaken in Russia, reflects great credit upon the manufacturers. It has every improvement necessary for a carriage of this kind. It consists of three compartments, the two end ones for holding the mail bags, parcels, &c., the middle forming a spacious light sorting room, provided with a skylight. It is shown fitted with a stove. The length of the carriage is 35 ft., the width 10½ ft., and its cost 4,600 roubles silver (£690). The carriage is seen mounted on an ingenious wrought iron truck, by which it can be conveyed along the high road by horses.—*From "The Engineer" of May 24, 1872.*

* * *

We have no patience with the man who wanted to put his suitcase on the engine because he had been told to send his luggage in advance.

* * *

Ninety years ago the first telegraph company in Canada was formed at Toronto and within a few days active construction was begun upon the pioneer wire line between Toronto and Hamilton (Ontario). Six months saw Toronto in telegraphic communication with New York and other points. By the end of 1847 the Montreal Telegraph Company had 540 miles of wire in use, had nine offices, and had sent 33,000 messages. Today the Canadian National Telegraphs operate 146,700 miles of wire (much with carrier current, the equivalent of 24 wires in one); the original nine offices have increased to 1,708; and the 33,000 messages filed in the first year have grown to 7,500,000 per annum.

* * *

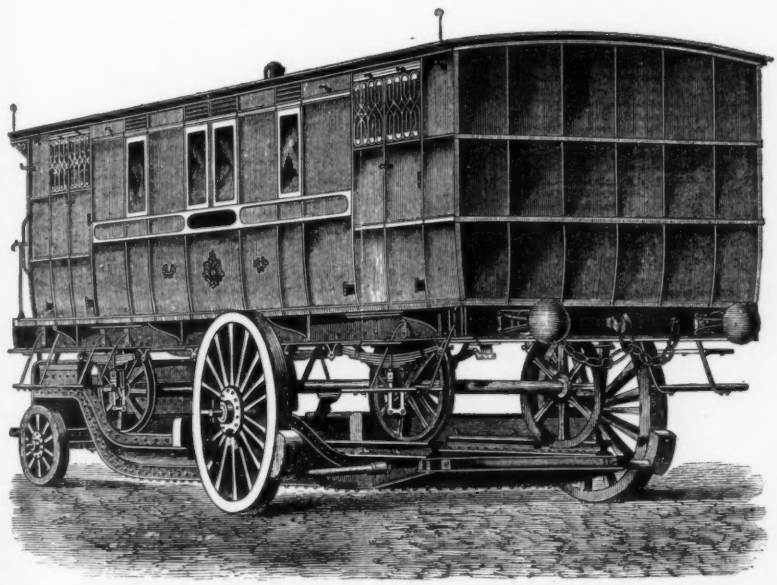
About 50 plain-clothes detectives on the staff of the London Underground do nothing else but ride about on the District Railway and the tubes looking out for cheats who try to get twopenny, threepenny, and fourpenny or even longer rides on penny tickets. . . It is recognised by the Underground authorities that automatic ticket machines have tended to encourage frauds. People in a great hurry will take a penny ticket at the machine in order to save time; they mean to pay at the other end. But they sometimes forget, and the forgetfulness becomes a habit. . . The detectives prefer not to say that women are more dishonest than men. If it is a fact that more women are caught—well, women are the more numerous sex, and when they perform these mean thefts they are not so clever at concealment as hard-faced men.—*From the "Evening News."*

* * *

After a lapse of many years in which William Armstrong's famous water colour, "First Railway Station in Toronto," had been lost as far as collectors were concerned, it has been found on an office wall in the headquarters of the Canadian National Railways. Recently, the painter's son, when passing the ticket office of the railway in Toronto, noticed and identified the long lost painting which had been placed in the window in connection with the 80th anniversary of the opening of the first railway between Montreal and Toronto. While a civil engineer and engaged in building railway bridges, William Armstrong was recognised as an artist of note and when the late King Edward VII visited Canada in the 'sixties as the Prince of Wales, and the late King George V some years later as the Duke of Cornwall and York, both bought some of his paintings.

* * *

R. and W. Hawthorn, the eminent engineers of this town, have just completed, for the Newcastle & Carlisle Railway Company, a new locomotive steam engine. The engine is estimated at a power of about 40 horses. The machinery was put into operation at the extensive works of Messrs. Hawthorn, on Wednesday, the 12th. . . Scientific gentlemen had been attracted to the spot from a desire to examine a new and vastly improved arrangement, invented by Messrs. Hawthorn, of the hand-gearing for working that portion of the mechanism called the slide valves. The ease and rapidity with which the motion of the engine was reversed by the man in charge of it, elicited the opinions of competent judges that the arrangement is as simple and perfect as the nature of the motion will admit. On Thursday the engine was conveyed to Blaydon, and made her first trip to Hexham in a highly satisfactory manner. It was ascertained that, in one part of the journey, she ran over a mile of ground in one minute—being at the rate of 60 miles an hour. It should be observed that her burden in this experimental trip consisted of only one carriage of passengers; but she had to contend with the opposing force of a strong west wind. At this tremendous speed it was with difficulty that the persons in charge of the engine could keep their places on the tender.—*From the "Newcastle Journal," October, 1836.*



*Russian Post-Office railway carriage of 1872 on a road trailer*

# OVERSEAS RAILWAY AFFAIRS

*(From our special correspondents)*

## ARGENTINA

### Proposed Extension to Santa Fé Provincial Railway

This company (one of the three French-owned railways in the republic) has sent to the Ministry of Public Works the plans and estimates for the extension of the existing branch from General Obligado to Capitán Solari, to Presidente Roca on the Bermejo river. This project is the revival of a scheme put forward in 1911 for constructing a line from a point between La Sábana and Barranqueras, on the same railway, to another on the Pilcomayo river, in proximity to the City of Asunción (the Paraguayan capital) which would thereby be practically linked up with the Argentine railway system. Government authorisation of the scheme was obtained in 1913, but the difficulties caused by the war interfered with the work, and the concession lapsed in 1917. In 1925, the company was authorised to extend the line for a distance of 75 km. in a northerly direction, and as a result, the branch between General Obligado and Capitán Solari, 73 km. long, was constructed. A subsequent Act authorised the company to continue the line from the latter point up to the Bermejo river, in accordance with the plans approved in 1913. It is this scheme, to be carried out in two sections of 39 km. and 45 km., respectively, that is now proposed. The estimated cost of the first section is $1,347,000 paper (approximately, £80,000).

### Maize Harvest Statistics

The third revised forecast of the maize harvest, issued by the Ministry of Agriculture, estimates this year's yield at a slightly higher figure than that given in the first and second forecasts of 9,650,000 and 9,696,970 tons (published in THE RAILWAY GAZETTE of May 8 and August 21). The total production is now officially given as 9,969,628 tons, which is 1,510,372 tons (13·2 per cent.) less than the previous year (11,480,000 tons); but is 1,355,457 tons (15·7 per cent.) above the average for the last 5 years, which was 8,614,171 tons.

### Institute of Transport (Argentine and River Plate Centre)

At the monthly meeting of the above Centre, held in Buenos Aires on September 28, a paper on "The Use of Tabulating Machines on a Railway," by Mr. W. Eric Bach (Chief Accountant, B.A. & P. Railway), was discussed. Prior to the meeting, a visit was paid to the Accountant's offices of the company, where the method of operating these machines was demonstrated and explained to the members present by Mr. Bach. The paper, which was illustrated by numerous specimens of statistical cards, described the machine tabulating system as applied to station audit control; statistics of goods and livestock traffic; passenger traffic audit and statistics; engine kilometrage and fuel consumption; analysis of stores materials; liquidation of men's earnings in workshops; preparation of pay-sheets; pension fund statements; house loan and income tax statements; wages appropriations in connection with the Traffic, Chief Engineer's, and Mechanical Departments; and the departmental control of expenditure. At the conclusion of the discussion the author was the recipient of a hearty vote of thanks.

## BOLIVIA

### New Air Service between La Paz and Uyuni

In continuation of the announcement in THE RAILWAY GAZETTE of November 13 regarding the inauguration by the PanAmerican—Grace Airways, Inc. of a bi-weekly passenger service between Buenos Aires and Córdoba (Argentina), the same company has now established a weekly service in Bolivia between La Paz and Uyuni, with stop-over at Oruro, all situated on the Antofagasta-Bolivia Railway. The service will be provided by Ford tri-motor aeroplanes, with accommodation for 12 passengers and a crew of three. The distance from La Paz to Oruro by rail is 243 km., and from Oruro to Uyuni 313 km. The single fares by the new air service are: from La Paz to Oruro $8.00 (U.S.), La Paz to Uyuni $18.00 (U.S.), and from Oruro to Uyuni $11·00 (U.S.).

## CHILE

### Increase of Tariffs and Wages on State Railways

A Decree issued by the Government authorises the State Railways to increase the passenger and goods rates by 10 per cent. The same Decree also authorises the railways administration to raise the salaries and wages of the employees by an equivalent percentage. Married employees, whose daily pay is less than 20 pesos (approximately equivalent at current exchange rates to 4s. 3d.), will be paid at special rates, graduated in accordance with their circumstances. These increases will come into force on November 12.

## COLOMBIA

### Derailment on Cundinamarca Railway

Advices from Bogotá report that a disastrous accident, involving serious loss of life, occurred on October 10 to a military train travelling on the above railway. As the train was ascending a steep gradient in a mountainous region, and was just about to enter a tunnel the two last coaches, in which there were about 60 soldiers, became uncoupled, and getting out of control, ran back down the incline, jumped a curve, telescoped and crashed amongst the rocks. Fourteen of the soldiers saved their lives by throwing themselves out of the windows, but 40 were killed outright, and the remainder seriously injured. A searching investigation was ordered by the railway authorities with a view to discovering if the uncoupling of the coaches was due to a criminal agency.

## INDIA

### Railway Inquiry

With regard to the Indian Railway Committee of Inquiry many of the Indian chambers of commerce consider the terms of reference unduly restrictive. They would have liked to see a specific mention of a thorough survey of the incidence of railway freights, particularly in relation to present commodity prices. As a matter of fact, the terms of reference do not exclude a review of this nature, and the inclusion of Messrs. Cheadle and Forbes suggests that the commercial side of railway operation will receive special attention. The desideratum of increased net earnings may be obtained both by economy in working expenses and by increased gross earnings, which are intimately connected with scales of rates and fares.

### Businessmen Discuss Railway Problems

The Committee of the Upper Indian Chamber of Commerce discussed important railway matters at the usual monthly meeting recently held at Cawnpore. The committee agreed to the suggestion of the Indian Central Cotton Committee of Bombay that an examination of the relative incidence of the ruling railway freight rates on cotton and other important commodities, with reference to their respective values, should be carried out without delay. To enable an examination of this important question to be effectively carried out on reliable data, the committee suggested the appointment of an expert to submit a comprehensive report on the subject. They further recommended that it was highly desirable to find out the ratio of the freight rate of raw cotton to its market price at the point of despatch as compared with similar ratios for other equally important commodities.

After considering a letter from the Chief Commercial Manager of the East Indian Railway on the question of enhancement in the classification of a large number of commodities, the committee came to the conclusion that an increase in the existing freight rates on many of the articles named would very seriously

affect the trade and industry of the country. They urged the railways to give further and more careful study to the whole question of railway freights and satisfy themselves that their policy would not divert more traffic to the road and, in the long run, result in heavier loss in traffic earnings.

The dissatisfaction of the Bengal Chamber of Commerce over the cancellation of the refund of 12½ per cent. surcharge on railway freight on bunker coal to Calcutta is recorded in the latest abstract of proceedings of the chamber. In reply to the chamber's protest, the Railway Board stated that the decision was made after discussion with the Indian Mining Federation. The committee of the chamber felt aggrieved that the board still persisted in the ill-advised policy of increasing railway freights instead of investigating every possibility of obtaining additional revenue by reducing freights. The cancellation of the freight surcharge on bunker coal without consulting the various commercial and shipping interests, was an additional ground for complaint.

### Cyclone Havoc in South India

A severe cyclone struck the south-east coast on October 28 and took a heavy toll of human life, crops and property. Railway communications were seriously dislocated for several days, and the damage to telephone and telegraph wires left in doubt the whereabouts of important trains, such as the Grand Trunk Express, detained en route. North of Ongole various sections of the line were submerged. The lines near Masulipatam and Masulipatam Port were under water for four miles. Rain and storm raged for about 60 hr., during which period irregular railway services in the affected area were maintained under the greatest difficulty. Normal communications have since been restored.

### Ticketless Travel

The railway courts established at Howrah and some other important places, having proved useful in dealing with cases of ticketless travel, the Madras & Southern Mahratta Railway has arranged with the civil authorities for a magistrate to hold a railway court at the Railway Institute, Madras Central station. The court will sit daily between 9 a.m. and 11.30 a.m., but will for the present exercise jurisdiction over a limited area. The Upper India Chamber of Commerce considers the provisions of the Indian Railway (Amendment) Bill, to deal with fraudulent travel, to be reasonable, and has no criticism to offer.

## NEW ZEALAND

### New Station for Christchurch

The Government has decided to build a new station at Christchurch, the largest city in the South Island and the principal port of entry. The station is expected to be on the most modern lines and on a scale to meet all present requirements and make reasonable provision for extensions of traffic. Following a visit of inspection during which the Minister of Railways inspected the old station buildings and made a detailed survey of the site of the new station and its relation to the layout of the proposed new yard, he expressed the view that the construction of a new station was justified from every point of view. The needs of the public, the provision of adequate quarters for the staff, and the introduction of adequate facilities for the efficient handling of the business of the Railway Department all combine to justify the provision of a new station.

### Express Train Accident

On August 30 an express train from Auckland ran into a slip on a bend at Paraparaumu (33 miles from Wellington). The "K" class locomotive was overturned down a bank, the leading car was stripped of sides and roof in collision with the tender, and four other cars were derailed. Three of the passengers in the leading cars were injured (one seriously), others escaped with slight bruises, and there were many on the train who did not realise an accident had occurred. Exceptional rain was the cause of the slip at a point where no slip has occurred since the line was built, 53 years ago. The carriage involved was a modern one, and Mr. G. H. Mackley, General Manager of Railways, attributed the comparative immunity of the passengers to the modern semi-steel construction of the rolling stock, which is built on the same principles as the latest British passenger vehicles.

## UNITED STATES

### Eastern Railways Authorised to Inaugurate C. and D.

The Interstate Commerce Commission, in a decision on October 31, authorised the Eastern railways to inaugurate, on November 1, their tariffs providing for free collection and delivery of less-than-carload freight. These tariffs, originally authorised for inauguration on April 1 last, were suspended for investigation by the commission at the instance of the road hauliers and the public cartage operators in several large cities. The decision, coming so late, did not permit the railways sufficient time to inaugurate the service on November 1; and announcement has been made that it will be begun on November 16. Meantime the disappointed road hauliers and carters threaten to attack the commission's finding in the courts.

The decision provides an allowance of 2½d. per 100 lb. for traders who do their own carting and it establishes 1s. 10d. as the minimum rate per 100 lb. at which the railways are permitted to offer this free service. (The railways had proposed 1s. 2½d. as the minimum, but evidence in the record showed that cartage costs alone amounted almost to that amount per 100 lb., leaving the railways little or no compensation for the line-haul, should free service be accorded for shipments at the lower rate).

Three of the eleven members of the commission dissented from the decision, among them being Commissioner Eastman (formerly Federal Co-ordinator of Transportation). Mr. Eastman contended that less-than-carload traffic is now unremunerative and that, to make it yield net revenue, there must be some pooling of the traffic among the railways; whereas the present plan contemplates an increase, rather than a decrease, in the cost of handling the traffic.

### Zephyr Record Trial Run

[In our issue of October 30 we recorded a cabled message to the effect that one of the new Chicago, Burlington & Quincy Denver Zephyr diesel-electric trains had covered the Chicago—Denver distance in 12 hr. 12 min. Further details of this trial run are as follow.—ED. *R.G.*] The route followed by the special was shorter than that of the regular passenger services, and omitted Omaha, a line avoiding the terminal there being traversed. The total distance, which was covered non-stop, was, therefore, 1,017·2 miles, and the exact start-to-stop time was 12 hr. 12 min. 27 sec. A maximum speed of 116 m.p.h. was attained at one point, and 26·6 consecutive miles were run at an average speed of 105·8 m.p.h. In addition, at eight other places on the journey, for distances ranging from 3 to 15 miles, speed greater than 100 m.p.h. was maintained. Sleeping cars were eliminated from the train for this journey, the train consisting of two power and six trailing units.

### High Speed, High Wages

Higher train speeds are making train and engine service posts among the most attractive in American industry. These employees on the American railways are paid by the hour or by the mile, whichever is greater. A standard day for passenger enginemen is 100 miles or 5 hr., for passenger trainmen 150 miles or 7½ hr., and for both enginemen and trainmen in freight service 100 miles or 8 hr. It goes without saying that these ratios of miles to hours were established years ago when train speeds were but a fraction of those obtaining in many places today. It is also true that allowed compensation averages considerably more than one standard day per month (it may range from 36 to 40 days a month).

Nevertheless, on one of the high-speed streamlined trains an engineman will earn a standard day's pay in less than 2 hours, running time, and a trainman in less than 3 hours. The consequence is that train and enginemen on these runs are earning more than 30 days' pay a month while, in some cases,

they are off duty over half the number of days. For example, the train crews on the Hiawatha between Minneapolis and Milwaukee work only 15 days a month and on the days that they do work the hours they put in total only 5¾ hr. running time, and 6½ hr. including preparatory time. For this service conductors receive monthly compensation totalling approximately £51 and brakemen approximately £36. On the New York Central many passenger train crews work through between New York and Buffalo, 436 miles. The journey is made by several trains in as little as 8½ hr. and for this service the men receive almost 3 days' standard wages. These crews are limited to 12 one-way journeys a month, which means that in a month they are paid almost 35 standard days' wages, while they enjoy holidays on no fewer than 18 days out of the month.

These instances are not, of course, by any means average; rather they represent the most favourable jobs on the railroads. On the other hand, practically every railroad has some such jobs to which their employees may aspire—and they indicate that the unions' proposed six hours' day for all employees has already been achieved—or a great deal more than achieved—by many of the staff who work by the mile rather than by the hour.

### Unions to Press for Six-hour Day

George M. Harrison, Chairman of the Railway Labour Executives' Association, has announced that the railway labour unions will endeavour to secure enactment by the next session of Congress of legislation establishing six hours as the standard working day in railway service. Bills calling for this innovation have been introduced in previous sessions of Congress, but their enactment has not been strenuously urged.

No proposal for a reduction in working hours has been made to the railway managements. Just as was the case with the railway pension legislation, the unions have ignored the managements entirely and have carried their demands direct to the National Legislature. If the demands were presented to the managements, they might ultimately be submitted to arbitration, in which case the proposal would be weighed on its merits, the railways' ability to pay also being considered. On the other hand, by going directly to Congress, no other argument is needed than the number of votes the unions can sway in returning members to their seats. Collective bargaining, for the right to which the unions contended for many years, until it was freely accorded them, has now been discarded in favour of political methods.

### Freight Rate Structure Adjustment

The "emergency" freight rate advances which have been in effect during the past two years, under permission of the Interstate Commerce Commission, expire at the end of the year, and the commission has refused authority to make these rates permanent. Hence, in order to conserve their revenues, they have petitioned the commission to delay action on approximately 1,000 freight rate cases to give the companies an opportunity to present new tariffs involving wholesale changes in rates. The new rates would involve quite as many decreases (where competition with the road is involved) as increases, but, in general, would be calculated to produce some £10,000,000 of added revenue annually.

## CHINA

### Hunan-Kweichow Railway

Construction work on the Chuchow-Siangsiang section of the Hunan—Kweichow Railway will shortly begin and certain contracts have already been let. Work on the Siang River bridge will also soon be begun, but the contracts have not yet been settled. This bridge, which will be the third longest in China, will take a year or more to build.

### Proposed Yangtsze Bridge

A project for the construction of a bridge across the Yangtsze River to give direct railway connection between the Peiping-Hankow and Canton-Hankow lines is under consideration. It is estimated that the cost of a combined road and rail steel girder bridge over the river between Hankow and Wuchang would be about $10,000,000.

### Miscellaneous Notes

A survey for a south-western extension of the Lung Hai Railway from Paochi to Chengtu, the capital of Szechwan, has begun. Extensive locomotive, carriage and wagon shops are to be built at Sanchiao, west of Sian, for which $5,000,000 of Belgian capital is to be subscribed; they will be the largest on the system.

A further extension of the Pisehtsai (Pishihgai)—Mengtoz—Kochiu (Kokiuchang)—Linan branch of the Yunnan Railway has now been completed to Shihping and was opened for traffic on October 10. The whole branch is 176 km. long. The last section from Linan was begun in 1929. The Chi-Lin section was completed and opened in 1928. The first section of the line to be begun was the Pisehtsai-Kochiu in 1913.

Through air traffic arrangements have been completed between North China and Manchuria on similar lines to the through railway traffic arrangements. The traffic will be handled by a new company under the title of the Hui Tung Company.

The Central Political Council, Nanking, has agreed to a three years' extension of the 50 per cent. reduction of the import duties on imported railway materials for Chinese National and Government-owned railways.

Through connection has now been established between the Nanking Municipal Railway and the Nanking-Wuhu Railway, and traffic will be operated over it on and from November 1.

### New Kowloon-Canton Express

A trial run, on October 14, of the new silver streamlined motor express train the Empress of Tapu, from Kowloon to Canton, was completed at an average speed of 79·5 km. p.h. over the distance of 165 km. The fastest scheduled time between Hong Kong and Canton is at present 2 hr. 55 min.

### S.M.R. Representative in Shanghai

The Manchukuo General Direction of Railways at Mukden has appointed Mr. Y. Ichihara to be its technical representative in Shanghai. Mr. Ichihara is an engineer and the purpose of his appointment is to bring about closer relations between the South Manchuria Railway and the Chinese railways and to give technical assistance to the Chinese railway authorities.

### The Hwainan Railway

On the recently-completed Hwainan Railway from the Lohochen coalfield to Yuichikow, on the opposite bank of the Yangtsze from Wuhu, there is a good train service now to Chaohsien, Luchowfu and the coal mines near Hwaiyuen; punctuality too is observed. The trains bring more than 2,000 tons of coal daily to the Yangtsze, seven miles below Wuhu, and it is shipped to Nanking, Chekiang, Wusih, Soochow and Shanghai. The railway also has plans for supplying all the larger towns between the mines and Chaohsien city with electric current, and it may also be possible for farmers in the dry summers to pump water into their parched fields. Suffering from drought is a chronic condition of the Luchowfu district, while but a few miles away there is always an abundance of water in the Chao Lake, states the *North China Daily News*.

### Canton-Hankow Railway Accident

On October 22, the third serious accident occurred on the newly-opened Canton—Hankow Railway. It appears that a double-headed mixed train of 24 vehicles stalled on the heavily graded northern ascent to the watershed on the Honan-Kwangtung border. The train was accordingly divided, and each engine was expected to take 12 vehicles onwards. The first one again failed to haul this load at a point further on, and so the four rear vehicles, which were full of troops, were detached. The second portion of the train waited for a time for line clear, but then a military officer, it is alleged, threatened the railway staff with a revolver, forcing them to take it on. Meanwhile the four vehicles, which had evidently been improperly secured, ran away backwards down the grade and met the second portion, with the result that 60—53 of them soldiers—were killed and 30 injured.

# SPAIN

### British Chamber of Commerce for Spain

Most of the committee and staff of the British Chamber of Commerce for Spain have now been evacuated, and the chamber has opened an office in London and is undertaking the representation of all British interests of its members in Spain, and also of those who may become associate members in England. The chamber undertakes to keep its members fully informed of all developments affecting their business, and also to support and prosecute claims for compensation, and so forth. The offices of the chamber in London are at 14, Queen Anne's Gate, S.W.1.

### Workers Substitute 10-hour for 8-hour Day

The employees of the Central Aragon Railway have notified, through their "workers' council," their resolve to suspend the regulation 8-hour day and to put into operation throughout the system a working day of ten hours, in order to meet the requirements of actual conditions. This is a fresh symptom of what is possible under the rule of the "workers' council" on the railways. It is the more remarkable because the whole of the subordinate staff of the Central Aragon railway struck work last May and the entire working of the railway was completely stopped for several weeks; indeed it was resumed only after the outbreak of the civil war. The strike arose mainly out of questions of rates of pay, but the application of the 8-hour day regulations was a side issue. It is significant that the workers, having gained at long last the much desired control of industry, should now be prepared to accept voluntarily a working day which they had previously claimed was beyond their powers. The Central Aragon system runs between Valencia and Catalayud, its length being some 250 miles. The company was originally Belgian, but the whole of the share capital was acquired by the Northern of Spain Company some years ago. The line is included in those placed under the control of the mixed committee by the Decree of August 3.

### Workers Carry On

Another instance of independent action by the "workers' committees" under the present Soviet rule, is that of the Great Southern of Spain Railway, which although the property of a British company, was seized by the workers in the same way as many other industries on the outbreak of civil war. In this case the "workers' council" of the railway has quoted specially low rates to the miners' union of the iron mines at Seron, where the men are attempting to work the ore on a co-operative basis, with or without the consent of the mining companies (one of which is British, the Bacares Iron Ore Mines Limited). No doubt the workers of both enterprises will be able to make a show of operating both mines and railway while surface ore is forthcoming and while the railway equipment lasts out, but if they do not provide for maintenance and renewals the day of reckoning will not be long delayed.

The boiler of the engine on a mixed train on the Lerida-Barcelona line exploded near Calaf on November 5. All the passenger coaches were derailed and more or less damaged, as well as eight goods wagons, but fortunately there were no passengers injured, although the driver and fireman were seriously hurt. The line was blocked for several days with the derailed vehicles. This accident no doubt may be described as a secondary consequence of the civil war, as repairs to engines and, indeed, ordinary inspection are of necessity being neglected and delayed in present conditions.

### Railway Conditions round Madrid

Both the principal Madrid termini have been damaged by shell fire and aerial bombing, but the Northern station has suffered most, having been for so long right in the front line, and occupied successively by the advanced forces of both sides. The main line through Villaverde and Aranjuez to Alcazar and the south, after being cut several times, has now been repaired, and the vital line of communication re-established between the capital and Alicante. The line is double track from Madrid only as far as Albacete, and during the last few weeks, except for the short intervals when it was cut at Aranjuez, it has been working to capacity, carrying reinforcements to Madrid in one direction and evacuating civilians in the other. Beyond Albacete, at Chinchilla junction, there is the bifurcation of the two lines, one to Alicante and Valencia and the other to Carthagena. The main congestion has occurred at Alcazar San Juan (the junction with the line to Seville and Andalusia), and at Albacete, where there is an important locomotive depot.

### Madrid Underground Dislocation

In Madrid itself recent aerial attacks have completely paralysed the tramway service and part of the Metro underground system is also stopped, the junction station, Sol, in the Puerta del Sol (the Piccadilly Circus of Madrid) having been partly destroyed by aerial bombs. As this is the central point at which all the radial lines converge or cross, it has meant the complete stoppage of the services on the adjacent sections. Here and on other sections of the Metro the approaches to the stations, and even the tunnels themselves are being used as refuges and shelters not only during air raids, but in many cases by whole families whose habitations have been destroyed or who have been driven in from the outlying districts. The partly constructed tunnels of the once famous "direct" railway between the Northern and Southern termini are also being used as refuges, but here also whole sections have collapsed, or have been inundated by broken water mains, the collapse of the roof in one place, under the impact of an aerial bomb, burying a number of refugees sheltering below.

### Conditions in Catalonia

In Catalonia the general conditions of operation and maintenance are improving. Defective engines are now no longer left in sidings to rust, but are instead sent to shops for repairs.

# FRANCE

### Two Metro Stations Opened

Two new Metro stations at the Porte Maillot have now been opened. These stations are on the line from the Porte de Vincennes to the Porte Maillot. This was the first line of the Metro system and has been in service since 1900. In 1934 it was extended eastward to the Chateau de Vincennes in the suburbs, and at present is being extended westward to the Seine at the Pont de Neuilly. This suburban extension will be ready for service next April. The length of the line will be 15 km., or rather more than 9 miles. The two new stations have a length of 115 yd. They are built below the level of the other stations, as the new suburban extension runs under the inner Ceinture railway and also under the new roadway tunnel, which was built to relieve surface traffic congestion. The stations are provided with escalators, which are set in motion by photo-electric cells when passengers approach.

Increased expenditure due to the Metro suburban extensions has raised the question of an increase in the second class flat fare from 70 centimes to 75 centimes. The additional 5 centimes would bring in fr. 80 million. At present it costs the City of Paris about fr. 200 million a year to cover its share of the Metro deficit. Bus and tram fares may also be raised proportionally; before the war the flat fare was 15 centimes. The transport authorities have the right to increase charges to five times the pre-war rates because of currency depreciation. Public opposition has hitherto prevented the increase. The question is now likely to be decided in a few days. Even with the new fare, travel would remain extremely cheap on the Metro, when it is considered that a passenger can travel anywhere he pleases on the Paris system for a flat charge of about 1½d.

### "Railway Life"

Another of the many interesting exhibitions that are organised at the Gare Saint-Lazare with the object of inducing French people to travel, has just been opened under the title of "La Vie du Rail." Almost everything pertaining to railway life is represented by models and photographs. The efforts made to cater for the comfort of tourists have a prominent place. The exhibition will be open until December 6.

# THE SUMMER TIMETABLES OF 193?

*A correspondent looks forward**

IT is a pleasant task to chronicle the great improvements in the passenger train services in Great Britain which are shortly to come into operation. There has been a real revision of timetables, quite equal to that undertaken by the German State Railway between 1933 and 1935, or by the State Railways of France in 1936, and it is all the more welcome because it extends to cross-country services and to secondary main lines. The programme is not "sensational"—there is no pruning of odd minutes to raise a train into a higher speed category intermediately without improving the through journey-time, none of those short 60-m.p.h. runs to terminal stops which imperil punctuality, and no attempt to maintain the faster weekday schedules on summer Saturdays, but there has been a real pooling of services, which has led to accelerations elsewhere at little mileage cost, and a general levelling-up of 20- and 30-year old schedules to suit modern travel requirements and locomotive power.

This policy is well instanced by the new express service between London and Birmingham. The G.W.R. and L.M.S.R. services are pooled, so that trains, at schedules varying from 1 hr 50 min. to 2 hrs., now leave each city hourly from 8 a.m. to 7 p.m., with additional limited non-stop trains by one or other route, at a schedule of 105 min., during the busier periods. The consequent rearrangement of the G.W.R. service between Wolverhampton and Chester has cleared the way for a complete revision of the Severn Tunnel "North and West" trains —which had tended to deteriorate ever since 1906—so that the best time between Crewe and Bristol is reduced to 3¼ hr. The working here is greatly simplified by the independent running, in several cases, of the South Wales portions (for which the mileage of the 1935 Manchester and Swansea trains is utilised) and by the routing of the through portions to and from Liverpool (Lime Street) over the Great Western line between Shrewsbury and Chester, thus lightening the marshalling work at Crewe, and enabling the Shrewsbury and Manchester schedules to be improved. There is also a modified pooling of L.M.S.R. and L.N.E.R. services between London and Yorkshire, whereby the departures from London round 6 p.m. are spaced out, and among other services standardised at regular intervals are London and Cambridge, Edinburgh and Glasgow, and Manchester and Sheffield (L.N.E.R.); and Manchester and Leeds, and Manchester and Liverpool (L.M.S.R.). In the last-named case there is an hourly 35-min. non-stop train over the old L.N.W.R. route, with an additional hourly service making intermediate stops, for which mileage has been found by the diversion to the L.N.W.R. route through Manchester (Exchange) of nearly all the 45-min. expresses hitherto using the heavily graded L. & Y. line between Manchester and Liverpool, though a few non-stop trains, at busy hours, continue to run to and from Liverpool (Exchange). We notice also an extension of Sunday express services, worked to the weekday departure times and schedules wherever possible, and including an afternoon train between London and Scotland, as well as a tendency to follow Continental practice by routing at least one fast service daily over the more important cross-country branches, with the object of concentrating through passengers on such services and reducing transfer work at junctions. Worcester to Norwich (via Oxford Road, Bletchley, Northampton, and Peterborough); Bangor to Grimsby (via Crewe, Derby, and Lincoln); and Shrewsbury to Cambridge) via Stafford, Uttoxeter, Nottingham, and Peterborough) are typical examples.

Turning now to a brief summary of actual alterations, the G.W.R. has re-cast its Paddington and South Wales service with considerable acceleration in the up direction (Paddington and Newport is now a 2¼-hr. run), and a new service of light and sharply-booked semi-fasts between Cardiff and Carmarthen (connecting with the Bristol and Cardiff railcars) has improved the communication with West Wales. Two trains in each direction do the Paddington and Bristol run in 1 hr. 50 min. (the Bristolian 1¾-hr. schedule being unchanged); Plymouth is 4 hr. from London; Oxford has three daily services with Paddington, up and down, in 1 hr.; certain very light trains, such as the 9.30 a.m. from Paddington to Cheltenham, are speeded up, and there is a general acceleration on easily-graded lengths (such as Bristol and Taunton) where schedules were palpably out of date. But the most welcome feature is the overhaul and acceleration of the cross-country services run in conjunction with the Southern Railway and L.N.E.R., or both, with through engine workings to avoid changes at such awkward points as Reading and Banbury, and, in the case of well established all-year-round services such as Birkenhead and Bournemouth or Cardiff and Portsmouth, the elimination of many stops—all of which will tend to greater punctuality.

The Southern Railway has, in addition to its share in these improvements, overhauled its own services thoroughly —especially the semi-fasts—and has not hesitated to revise the whole timetable of the Central Division electrics. The standard express timing to Brighton is now 55 min., and to Eastbourne (by alternate trains) 75 min.; Portsmouth is 80 min. from Waterloo by non-stops and 85 and 90 min. by semi-fasts, and Hastings is 75 min. from London Bridge. In the steam services, the Victoria to Margate best times vary from 82 to 90 min., and most of the boat trains reach Dover in 85 min. The Waterloo and Bournemouth non-stop timing stands at 115 min., but there are three 2-hr. trains in each direction calling at Southampton, and the slower services drop behind the best timings to the extent of only 4 or 5 min. per stop, which, though it may appear a modest achievement, accelerates a train like the 3.30 from Waterloo by 25 minutes. On the Exeter service, the best non-stop timing saves only 2 minutes on 1936 (85 min. Waterloo to Salisbury, and 95 min. Salisbury to Exeter) but there is a great speeding up of semi-fasts, which are usually lighter trains than the non-stops, and are now timed accordingly. The summer 11 a.m., for instance, with a new stop at Axminster, loses only 9 min. to Exeter on the 10.35, and the 2.26 p.m. up from Exeter is only 22 min. slower than the 12.30, with five more stops. The 6 p.m. from Waterloo becomes a 3-hr. 20-min. train to Exeter with three stops, and the former 5.53 p.m. from Exeter is once more a 3½-hr. train to London. The local and semi-fast service west of Exeter is all revised and quickened, and we note in particular the running of G.W.R. trains from Taunton through to Bideford, and the routing of the new Ilfracombe—Portsmouth train via Taunton, Bristol, and Bath.

On the L.M.S.R. the principal Western Division items are the 6¼-hr. Euston and Glasgow late afternoon services

* We would warn too matter-of-fact readers and news editors of daily papers not to regard our prophetic correspondent's article as being in any way officially inspired.—ED. *R.G.*

(calling only at Preston), and the 2¾-hr. morning and evening non-stop trains between Euston and Liverpool and Manchester. The midnight Euston and Glasgow " sleeper " reverts to its old 8-hr. schedule from its rather ludicrous booking of 9-hr. 50-min. There has also been a great quickening up over the easy road from Crewe to Holyhead (the Irish mails now take 4¾-hr. between Euston and Holyhead) and a thorough revision of the service between Lancashire and Scotland, whereby a 4½-hr. schedule is set up between Manchester and Glasgow, and the old 9.35 a.m. from Manchester put in connection with the former 1.40 from Glasgow to the north, and the 1.10 from Aberdeen with the 4.30 from Glasgow to Lancashire—an excellent instance of the new services which time table revision can secure. As we expected, the almost immediate success of the Oxford and Cambridge railcar service (a return to the schedule of 1905, which resulted from *The Times* correspondence in 1936) has led to many new railcar services elsewhere, and we welcome in particular their introduction between Barrow and Workington, where they will be a boon to passengers who have long had to spend 2 hr. over the 45-mile journey between Barrow and Whitehaven, as well as the Barrow—Darlington (via Tebay) car, and the Oxford—Derby service.

The timetable on the Midland and Northern Divisions of the L.M.S.R. is completely re-cast to suit the locomotive power now available. The Midland Division service does not revert to the long non-stop runs of pre-war days and retains its town-to-town character, but there is one evening express from St. Pancras to Manchester in 3 hr 20 min., which should ease the pressure on Euston at 6 p.m., and Leicester is reached in 100 min., Nottingham in 125 min., Sheffield in 170 min., and Leeds in 210 min. In Scotland we find 3¼ hr. the recognised Glasgow—Aberdeen schedule (without new mileage or curtailment of necessary stops); the Perth to Inverness time has come down to 3 hr., and Inverness to Wick (for the summer) to 4¼ hr., while the local services between Tain and Wick save from 30 to 45 min. on the journey. A useful service of local railcars is also introduced.

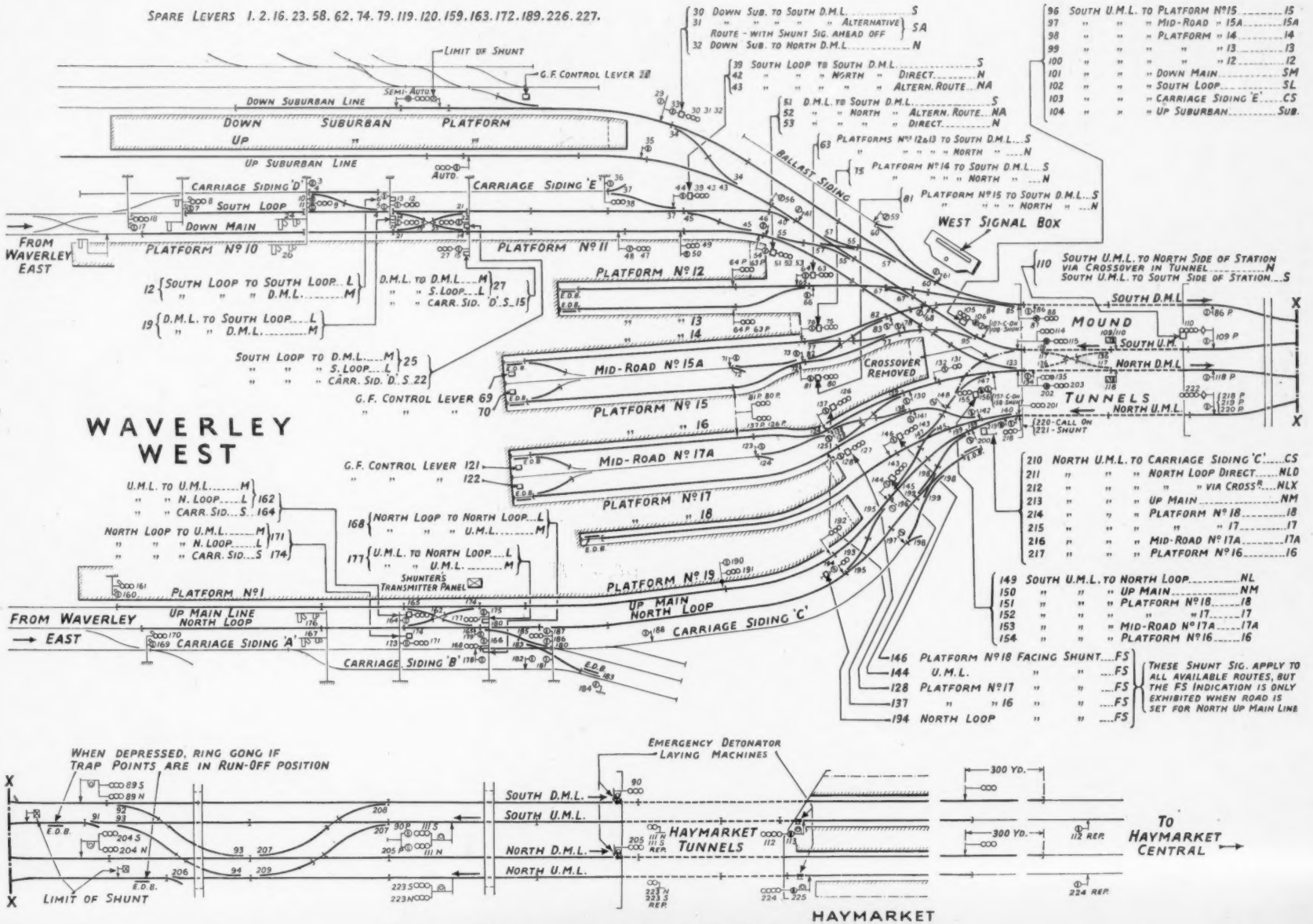
The L.N.E.R. 4-hr. schedule to Newcastle, 6 hr. to Edinburgh (we note that the 4 p.m. King's Cross departure time adopted for this train has been a great success) and 2¾ hr. to Leeds are of course not reduced, but a new morning " flyer " leaves King's Cross at 8.15, making its first stop at Retford at 10.25 (to give Grimsby and Sheffield connections) and reaching Leeds at 11.30 and York at 11.25. Acceleration of the 11.30 from York gives a London—Edinburgh time by this train of 7¼ hr. All the King's Cross and Leeds trains are smartened up, though with no extra mileage and little curtailment of stops—the old 5.50 becoming a 3¼-hr. service—and we note with pleasure the running of two fast railcar services between Peterborough and Grimsby (in 1½ hr., with Spalding, Boston, and Louth stops), and two between Sheffield and Grimsby, routed via Lincoln and Market Rasen. The Great Eastern area has improvements quite as radical as those of October, 1914, and Cambridge in 65 minutes, Ipswich in 75 min. and Norwich in 125 min. (all by several trains each day) are gratifying, if not sensational, gains. New railcar services run between Ipswich and Peterborough, and are worked through over the L.M.S.R. route—one to Birmingham via Melton and Leicester, and one to Coventry via Market Harboro'.

In the North Eastern area, there is a considerable pruning of the time allowed between Darlington and Newcastle, a restoration of the 82 min. York and Newcastle booking (by the 9 a.m. from Leeds, now due at Waverley at 1.15), and the adoption as standard of the 130-min. Newcastle and Edinburgh schedule of 1936 (135 min. with a Berwick stop). A 3-hr. timing between Edinburgh and Aberdeen, with six stops, is maintained by three trains a day in each direction, but the Glasgow and Edinburgh standardised service keeps 55 min. as its best time. The Great Central section, besides sharing in many of the cross-country improvements already mentioned, has reinstated a Sheffield Special in 2½ hr. between Sheffield and Marylebone, working up at 9 a.m. and returning at 5.30 p.m. The train actually starts from and finishes at Bradford (Exchange), serving Halifax and Huddersfield, and the old 10 a.m. from Bradford and 6.20 from Marylebone cease to run between Sheffield and Bradford.

The preliminary rumours of these sweeping changes have naturally aroused some criticism. We do not agree that there is anything retrograde in the small supplement charged by the L.M.S.R. on its 6¼-hr. Glasgow and 2¾-hr. Manchester and Liverpool trains. The readiness of the public to pay the L.N.E.R. supplement for the Silver Jubilee, and subsequently for the 6 hr. Edinburgh and 2¾ hr. Leeds services, has proved that there is in England, as abroad, a public willing to pay for speed, and the strict limiting of, and compulsory seat registration on, trains like the 105-min. London and Birmingham expresses and the Sheffield Special seem to us reasonable and necessary. Nor do we believe that the re-casting of many " commercial " services, and the alteration of some long-established starting times, will cause more than a momentary inconvenience; there has, we think, been a tendency in past years to ignore possible changes in the travel habits of the public, and to forget that the timetable which prides itself on its conservatism is open also to other charges. We welcome, too, the running of buffet cars, in place of restaurant car sets, on many cross-country trains and on the shorter " commercial " runs, especially at midday, for the demand for an elaborate midday meal is growing less, and the more elastic service of the buffet, which reduces haulage and saves staff, will prove popular. This is especially true of the L.M.S.R. and L.N.E.R. Scottish areas, and we notice with satisfaction that the L.N.E.R. tariff is in future to be standard for buffet and restaurant cars on both groups.

## Signalling on the Dover Tramways

The electric trams at Dover, which were among the earliest in this country, are, as recorded in the Road Transport Section of November 20, to cease running on December 31 and be replaced by buses. It is therefore appropriate to record that an interesting signal system was adopted for them some 37 years ago to facilitate working the single line sections. Some of the streets of Dover are narrow and winding, so the tramway passing loops were not in sight of each other. In such conditions delays and misunderstandings are almost unavoidable, especially in foggy weather, and cars are liable to meet on the single line. In 1899 Saxby and Farmer, at the desire of Mr. H. I. Stilgoe, then Borough Engineer, developed a signal system to meet the difficulty. Electric semaphore indicators, mounted on a kind of fire alarm pillar, were placed at the loops. The tram conductors were supplied with keys to open a small door thereon, disclosing hand plungers which at one end of a section could be used to block the line, and at the other, to free it. A conductor, finding an approaching car signalled, did not need to touch the apparatus, but departed directly the car arrived, knowing that another could not come towards him against the miniature signal at the far end. The apparatus was put in from Strond Street to Snargate Street and Pent Street, and from Priory Bridge to the Winchelsea terminus. It was worked by momentary current from batteries and was thus independent of the trolley circuit.




*Track and signal diagram of Waverley station (West end) L.N.E.R.*

# POWER SIGNALLING AT EDINBURGH, L.N.E.R.

***New 227-lever power signal box at Waverley West replaces five mechanical boxes; special protection provided to meet unusual movements***

THE new signal box at Waverley West, opened on October 11, is a stone fronted building of 2 floors, the lower accommodating the relays, of which there are 502, the upper a 227-lever frame, with electric interlocking, the train describers and an illuminated diagram. The lever naming and release numbers are on a semi-transparent plate in desk form in front of the levers. Points are repeated by " N " and " R " light indications. The " on " position of running and shunt signals is indicated by a red light, the " off " position (whatever the actual aspect may be) of the former being shown by a lunar white light, while point levers have also a " free " indication, controlled by the track circuit conditions. The electric locks for ordinary interlocking and track or back locking are separate, the former being sealed. The illuminated diagram is supported on pillars and is 15 ft. long. The background is olive green, pleasing and restful to the eye, and each track section is provided with two red lamps, which light up when it is occupied. The arrangement of the relay room is particularly neat and all incoming and outgoing wires are terminated on fuse and terminal racks. Control and indication wires in the vicinity of the yard consist of single core conductors, the main feeders being twin core cables of the " ite " type. Long runs, through the Mound and Haymarket tunnels have oil impregnated, paper insulated, lead covered multi-core cables.

*The old signal box at Waverley West, with the new one on the left*

## Signals and Point Mechanisms

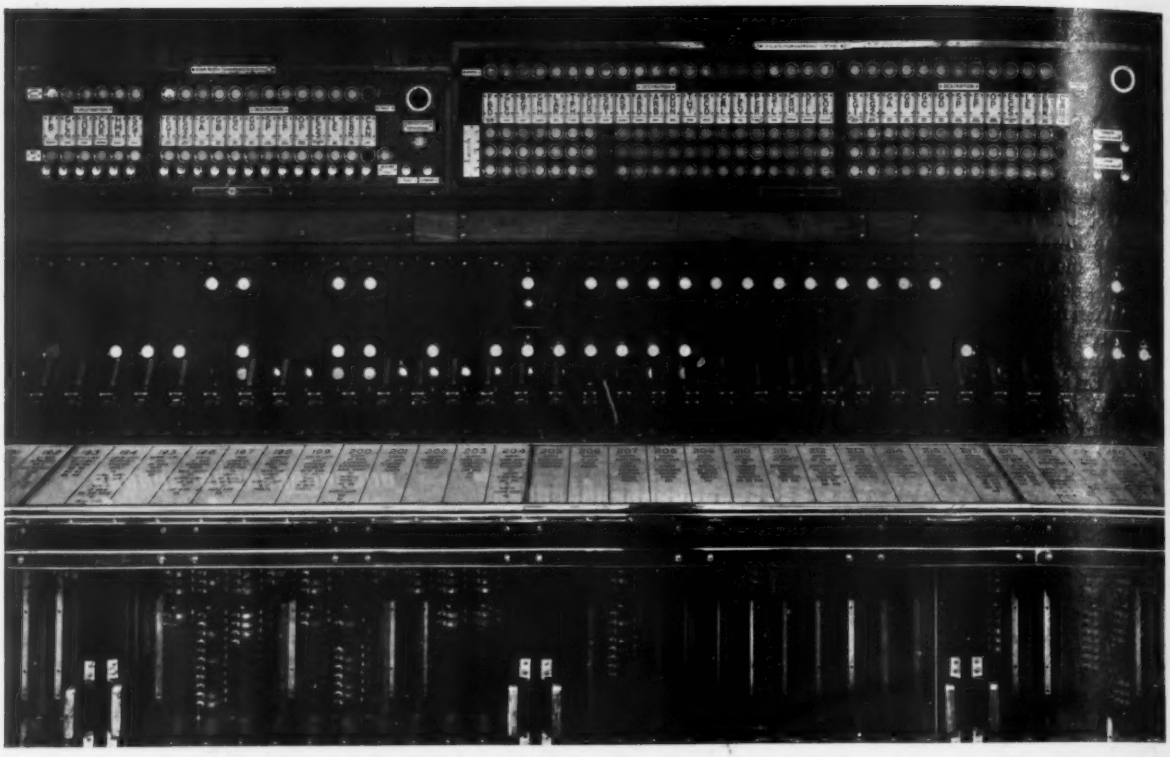
All running signals are of the colour-light multi-lens type and standard three and four aspect indications are given. There are individual side lights and back lights for the red indications. Starting signals from Platforms 12, 14 and 15 have backlights also for the yellow and green aspects, controlled by the same lever as the front lights but separately repeated, as engines of long trains sometimes stand in advance of them. Splitting signals are provided for the crossover junctions beyond the Mound tunnels, but elsewhere diverging routes are indicated by S.G.E. blind type route indicators, with indications front and back, the latter serving to advise men on the line where an approaching train is being sent. Ground shunt, " calling on " and " warning " signals are of the banner type, internally illuminated, eliminating coloured lights from shunt indications. Running signals are preceded by the shunt signals in advance on the route they govern. There are 4 4-aspect, 58 3-aspect, and 5 2-aspect signals and 90 banner signals. Telephones are provided where necessary, to enable drivers and signalmen to communicate with one another.

There are 72 point machines. The F.P.L. layouts generally include the British Standard bolt equipment; the detection boxes are self-contained. When points have been reversed and locked the motor is dynamically snubbed and the operating circuits are protected by cross protection relays at the signal box. Detection relays are short circuited if the points are not home.

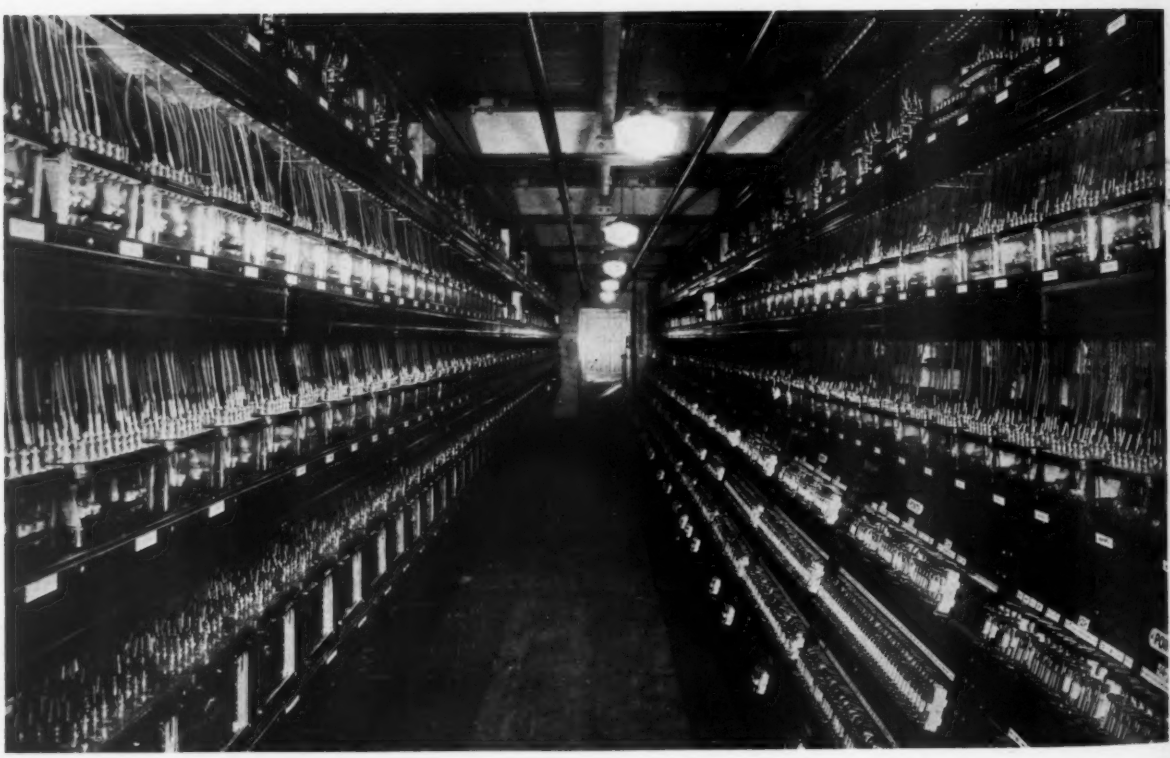
## Track Circuits and Electric Locking

The track circuits have condenser feed and there are nearly 700 relays of various types, including 132 track relays and 54 time-element relays automatically operated, where delayed action is required, say for a signal approach lock or certain " off " indications. Electric locking has been added to 18 levers in Waverley East box in connection with controls from the new West box. Stick relays control the through line working in such a manner that when a signal at one end is cleared for a train, those at the other end leading to that

*Track and signal diagram of Waverley station (West end) L.N.E.R.*

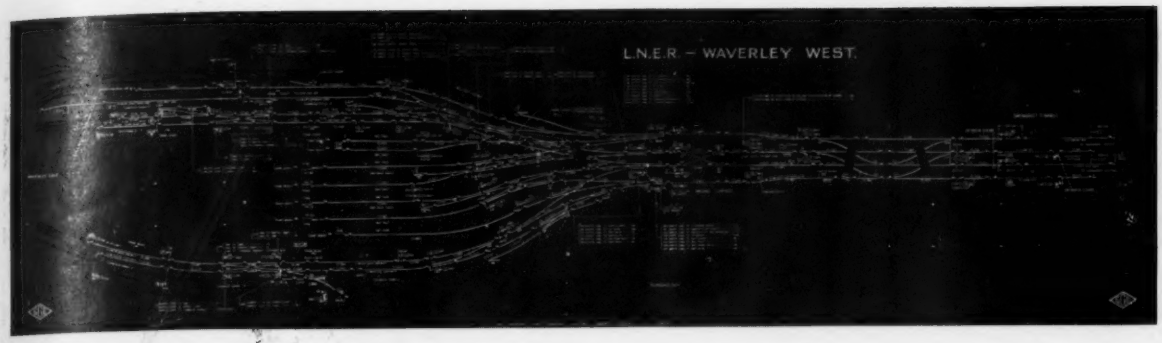


*A section of the frame with train describers above*

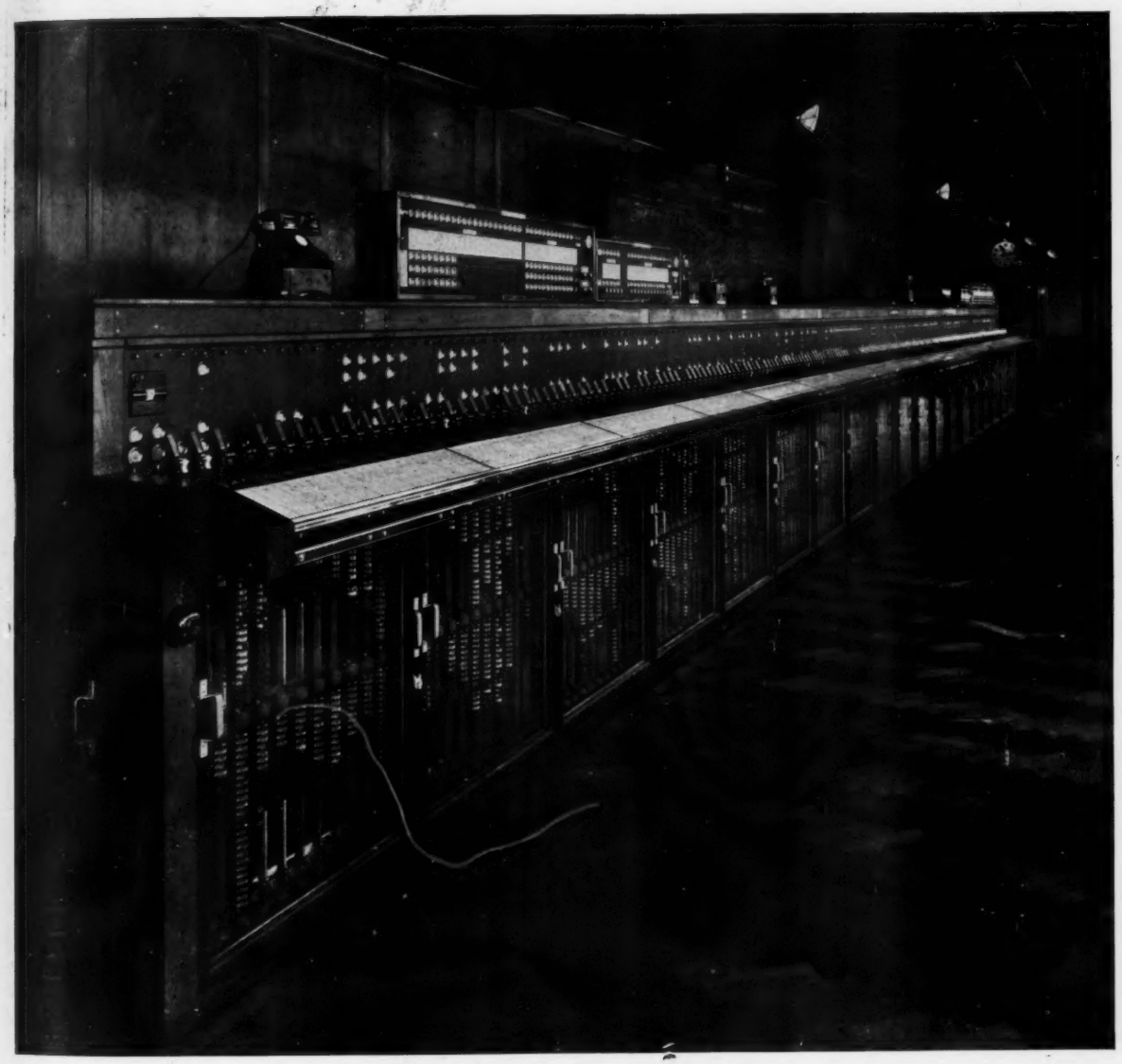


*Interior of the relay room at Waverley West*

*POWER SIGNALLING AT EDINBURGH,*




*The illuminated diagram*



*Interior of the new Waverley West signal box*

*WAVERLEY STATION, L.N.E.R.*

line are locked until the lever which is over is put normal and a time interval has elapsed. This is long enough to allow the train to reach a track circuit controlling signals for the opposite direction of traffic before the relay has returned to its normal condition, which it must do to allow another movement to be signalled. Stick relays are also used in connection with the facing shunt signals Nos. 114, 135 and 201. These have an illuminated St. Andrew's cross indication which must be showing before the yellow aspect will appear. The stick relay drops when a facing shunt lever is pulled and will not pick up unless the lever is returned to normal and all track circuits in the line protected are clear. No running movement can be signalled until this control is obtained, but warning signals 113 and 225 at Haymarket can be operated while facing shunt working is in progress on the up South and North lines respectively. The indication " F.S." appears on the route indicators working in conjunction with the shunt signals for these movements. The up and down suburban platform lines, being long enough for two trains, are divided by automatic signals half way along.

### Train Describers

Between the new West and Haymarket Central boxes magazine train describers of the S.G.E. name, description, and destination system have been installed. Block telegraph working has, of course, been given up, but bell communication is provided for emergency use. The description and destination of a train are set up by pressing the relative transmitter keys, upon which lamps light up next to the corresponding labels on the instrument. Transmission is then effected manually and the messages are received at the other box, being displayed by lamps on the receiver instrument. Six trains can be described, three being indicated in order at the receiving end, the remaining descriptions being stored. The arrival of a train automatically transfers the indication from the " in section " column on the receiver to the " train arrived " column from which it disappears when the train passes the respective signal box. If a starting signal is cleared for a train which has not been described forward an audible warning sounds until that is done.

### Shunters' Describers

To expedite shunting at the north central scissors crossings and carriage sidings a shunter's transmitter panel has been provided on the platform near the crossings, working with a receiver indicator in the West box, on the train describer principle. " From " and " To " keys are depressed by the shunter, lighting corresponding indicating lamps on the signal box apparatus, accompanied by a low-note buzzer; a return indication assures the shunter that the correct message has been received. Four indications can be displayed at one time in the box and two more stored. Clearance is effected manually, and provision is made for cancelling a wrong description.

### Power Supply

A 230-volt single-phase supply is taken from the Edinburgh Corporation and fed to a switchboard in the power house adjacent to the signal box. A 26 kVA. " Austinlite " automatic stand-by plant has been provided, bringing a 230-volt a.c. supply into operation if there is a drop in, or failure of, the Corporation supply. This stand-by equipment is automatically closed down when the outside supply is restored. It consists of a Morris Industrial 4-cylinder petrol engine, developing 38 b.h.p. at 1,500 r.p.m., direct coupled to an E.E.C. screen-protected alternator, through a flexible coupling, itself in turn coupled to an E.C.C. starter motor and exciter. The starter battery is kept fully charged. Power for signals

*Three-aspect light signal with backlights to all aspects, and route indicator and shunt signal below*

and track circuits comes from 110-volt a.c. mains, but point machines are operated on 110 volts d.c. A 440-volt a.c. main runs to Haymarket, where transformers provide the 110-volt a.c. supply.

### Supply of Equipment

The contractors responsible for the whole of the work, including describers, auxiliary power plant, cables and wiring, were The Siemens & General Electric Railway Signal Co. Ltd. Lead covered, paper insulated cables are of Messrs. Siemens Bros. manufacture and Brumite insulated wires and cables are used for general wiring.

The signalling scheme was prepared to meet the requirements of Mr. R. Gardiner, Superintendent, Southern Scottish Area, L.N.E.R., the work being carried out to the instructions of Mr. W. A. Fraser, Engineer, L.N.E.R. (Scotland) to the designs and under the immediate supervision of Mr. A. Moss, Signal and Telegraph Engineer (Scotland).

(*Editorial comment will be found on page* 879)

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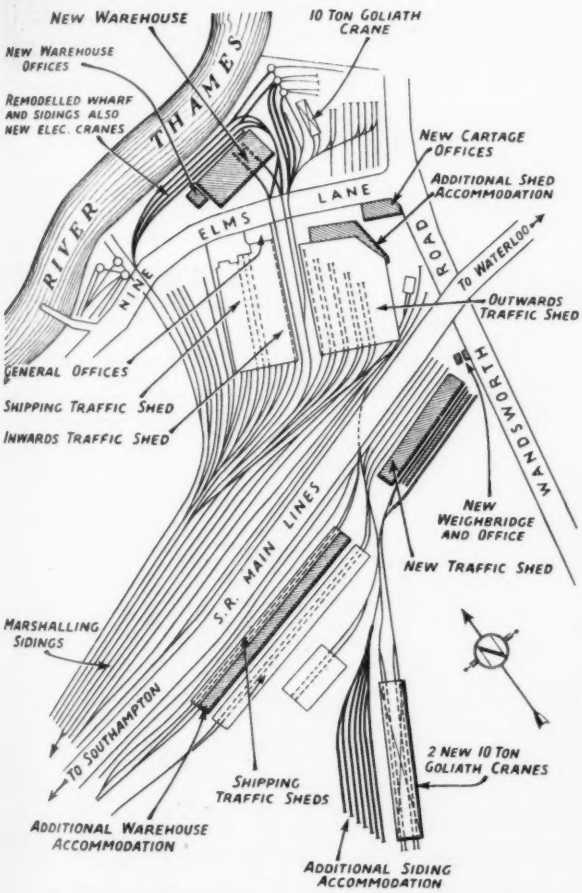
L.N.E.R. Demonstration for Schoolchildren.—On Monday last the L.N.E.R. opened at West Hartlepool a demonstration of railway operating methods and equipment for local schoolchildren, which is to last for a fortnight. While locomotives and rolling stock figure just as they have done in earlier exhibitions arranged by the company of these items in particular, special prominence is given to actual working details, such as signalling, braking, and carriage heating. The engines shown are in steam and ready for the road. A novelty is a film show dealing with famous expresses of the four groups.

# NEW SOUTHERN RAILWAY WAREHOUSE AT NINE ELMS

## *A mechanical plant reducing to the minimum man-handling of goods*

ON Monday last the Southern Railway brought into use a new mechanised warehouse on the south bank of the Thames adjacent to Nine Elms goods depot. The building, which is of striking appearance, is constructed of reinforced concrete with brick panelling. There are seven storys and three towers. All the operating machinery is concentrated in the towers and the top floor. The remaining six floors are all free for storage. Four are laid with maple wood for storing grain, and two are of granolithic finish for the accommodation of other commodities. Altogether, the total storage area is 135,000 sq. ft., or approximately three acres, which is sufficient accommodation for about 12,000 tons of merchandise. Throughout there is ample ventilation and good lighting. The building is 310 ft. long, 80 ft. wide, and 100 ft. high to the top of the three towers.


*General view of the new warehouse*




*Layout of Nine Elms depot, Southern Railway*

The mechanical plant reduces the man-handling of goods to the minimum. Goods arriving by river are lifted by the wharf cranes and placed either on a ground floor platform, or alternatively may be loaded direct to the upper floors by means of loophole doors, provided in five positions on each floor on the river side. Grain in bags is received on the ground floor, whence it is taken by one of six special vertical sack elevators to any floor above. These elevators have a capacity of 380 bags an hour. If the grain is required to be taken to another portion of the building, not immediately above the reception point, the bags are carried up in the elevators to the top of the three towers. There the sacks are discharged into a junction chute capable of being placed in six different positions so that they can be slid down on to any one of three reversible conveyor bands, whatever their direction of travel, on the floor below (the sixth). At various points along the length of these conveyors, which move at 150 ft. a minute, " ploughs " can be placed to divert sacks down any desired spiral chute. There are 16 of these chutes running down through the building, and at each floor a means is provided for removing descending sacks and landing them as near as possible to the part of the floor where they are to be stored. By this carefully thought-out arrangement barrowing is reduced to a minimum.

Four of the twelve chutes are twin chutes, and are located where railway sidings enter the building on the south side. They are painted red to distinguish them from those serving the road loading banks. A railway siding for reception purposes is also provided alongside a covered platform on the river side front of the building. Three weighing machines on this platform may be reached by the crane on the wharf side through the gaps in the canopy. For handling commodities not in sacks the building is equipped with three lifts, all of which have a capacity of 2 tons.

The building is equipped throughout with automatic

*Conveyor bands and one of the three distributor chutes on the sixth floor*

electric fire alarms, installed by Peter Lind & Co. Ltd., which give immediate warning of any rise in temperature in any particular locality. The elevator and chute equipment was supplied by Spencer (Melksham) Limited, and the electrical installation, which includes the floodlighting of the building above the first floor, has been carried out by Drake & Gorham Limited.

Office buildings are provided to house the various departments required in connection with the warehouse. These are equipped with central heating, the plant for which has been designed to provide heat to a portion of the granary, if this should be found desirable, for the storage of goods, which have to be maintained in an equable temperature. The heating installation was carried out by Rosser & Russell Limited.

The architect and consulting engineer for the building was Dr. Oscar Faber, O.B.E., D.C.L., D.Sc., M.Inst.C.E., assisted by Mr. K. Montgomery-Smith, B.Sc., A.M.Inst.C.E., A.M.Inst.Struct.E. (structural work and grain handling plant), and Mr. J. R. Kell, M.I.H.V.E. (mechanical and electrical equipment). The whole of the work was under the general instructions of Mr. G. Ellson, O.B.E., M.Inst.C.E., Chief Engineer, Southern Railway.

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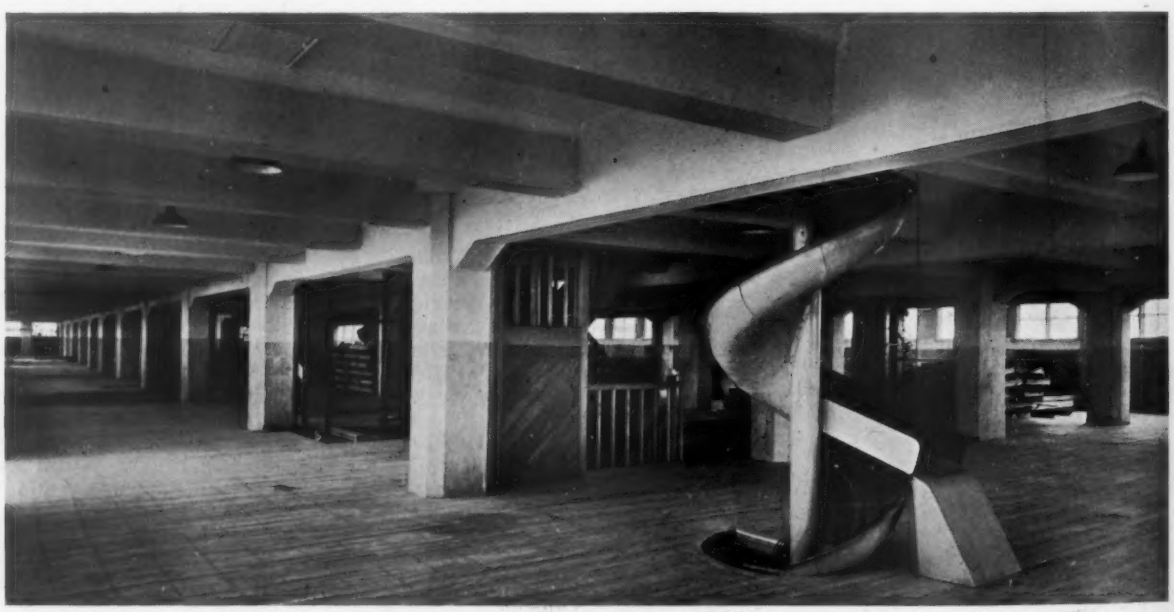
WINTER SPORTS IN THE U.S.A.—A winter sports bureau, where the public may readily obtain information pertaining to snow and weather conditions, and fares and schedules of one-day and week-end snow train excursions, was inaugurated on November 16 by the Pennsylvania Railroad. The Bureau is in the company's city ticket office at 1417, Chestnut Street, Philadelphia. Through snow trains for winter sports enthusiasts consisting of dining cars, baggage coaches for the checking of equipment, and even special equipment cars, will be run over week-ends to the principal winter sports centres. Similar facilities last year attracted a large patronage, so special preparations are being made to avoid overcrowding.



*View of one of the floors laid with maple wood for storing grain. One of the twelve spiral chutes is shown in the foreground*

# RAILWAY NEWS SECTION

## PERSONAL

Sir Ralph Wedgwood and Mr. W. A. Stanier of the Indian Railway Committee of Inquiry, arrived in Bombay on November 20.

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Mr. H. C. Lusty, A.M.Inst.C.E., who, as announced in THE RAILWAY GAZETTE of November 13, has been promoted to be Assistant Chief Engineer, New Zealand Government Railways, joined the department as a civil engineering cadet in 1912 in the Chief Engineer's office at Wellington. After experience as a draughtsman in the District Engineers' offices at Dunedin, Greymouth, Wanganui and Ohakune, he was appointed Assistant Engineer at Christchurch in 1924, Acting District Engineer in Dunedin in 1931, and District Engineer, at Invercargill in 1932. In September, 1933, Mr. Lusty was appointed Inspecting Engineer at Head Office, a position he has continued to occupy until his present appointment.

*Mr. H. C. Lusty,*

Appointed Assistant Chief Engineer, New Zealand Government Railways

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Mr. A. H. Murison, A.M.Inst.C.E., who, as recorded in our issue of November 13, has been appointed Inspecting Engineer, New Zealand Government Railways, joined the department as a civil engineering cadet in the District Engineer's office at Auckland in 1915. In 1919 he was promoted to draughtsman and had experience in that capacity at Auckland, Wellington and Wanganui, and in the Chief Engineer's office at Wellington. Mr. Murison was appointed Assistant District Engineer at Wellington in 1924, District Engineer at Ohakune in 1933, and was attached to the staff of the Chief Engineer's office at Wellington last year.

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From *The London Gazette* of November 20: The King has been pleased to reappoint Mr. John Quirey, C.B.E., to be a permanent member of the Railway Rates Tribunal for a further term of three years.

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The Lord President of the Council has appointed the Rt. Hon. the Viscount Falmouth to be a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research. Professor A. C. G. Egerton, M.A., F.R.S., has retired from the council on completion of his term of office.

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Sir George Gillett, who has been appointed Commissioner for Special Areas (England and Wales), was Parliamentary Secretary to the Ministry of Transport in the first National Government (1931). He was also Secretary to the Department of Overseas Trade in the Labour Government, 1929-31, and was M.P. for Finsbury, 1923-31.

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The Minister of Transport, after consultation with the Lord President of the Court of Session, has appointed Mr. W. D. Patrick, K.C., to be a Deputy Chairman of the Road and Rail Traffic Appeal Tribunal in succession to Sheriff C. Black, who has resigned.

*Mr. A. H. Murison,*

Appointed Inspecting Engineer, New Zealand Government Railways

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We regret to record the death, on November 21, of Lord Joicey, the well known Durham coalowner, who was sometime Deputy Chairman of the former North Eastern Railway and a Director of the L.N.E.R. He became a Director of the N.E.R. in 1889 and in 1913 was elected Deputy Chairman,

Phot.] *The R.O.D. dinner on Friday last.* (*See report on page* 902) [*Swaine*

*Above: Bournemouth–Waterloo express passing through Otterbourne cutting. The train is headed by "King Arthur" class 4-6-0 locomotive No. 784, "Sir Nerovens," and the rear is made up of L.N.E.R. coaches for Bradford, York, and Newcastle, which are detached at Basingstoke*

*Photo.] [O. J. Morris*

*Above: A train-load of motorcars on the Gotthard railway about to enter the famous 9-mile 550-yd. tunnel. The Swiss Federal Railways convey a considerable number of motorcars by the route during the period that the Gotthard pass is snowbound*

*Left: Rebuilding worn crossing rail by oxy-acetylene method with B.O.C. wear-resisting rod*

the position he held until the amalgamation in 1923. He afterwards remained as a Director of the L.N.E.R. group until 1929, when he resigned. He had therefore served on the boards of the two companies for over 40 years.

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We regret to note the death on November 23 of Mr. O. P. Van Sweringen, the younger brother of Mr. Mantis James Van Sweringen, whose death we announced in our issue of December 27 last. The careers of the two brothers were bound up together, and are outlined in the Personal columns of that issue. In an editorial published on September 27, 1935, the activities of their 25,000-mile railroad system is dealt with; moreover, in our issue of August 11, 1933, we included an article entitled "The Rise of the Van Sweringens," which throws further light on their many railway connections.

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INSTITUTE OF TRANSPORT

The following members and associate members have been elected during the summer and autumn:—

*Members*

Mr. W. E. Bach, Chief Accountant, Buenos Ayres & Pacific Railway.

Mr. J. E. S. Bodger, Deputy Engineer, W. & W., Ceylon Government Railway.

Mr. W. Heckroodt, Superintendent (Staff), and

Mr. W. Moyers, Chief Civil Engineer, South African Railways and Harbours.

Mr. A. Henderson, Chairman of Traffic Commissioners, Southern Scottish Area.

Mr. R. F. Hill, Engineer, Electric Train Running Section (Sydney), New South Wales Government Railways.

Mr. J. H. McEwen, General Manager, Nigerian Railway.

Mr. B. F. Tee, Commercial and Operating Assistant of Road Transport, G.W.R.

Mr. T. J. Tilston, Divisional Superintendent, London Passenger Transport Board (Trains, &c.).

Mr. R. D. Walker, Manager and Chief Engineer, Kowloon-Canton Railway.

*Associate Members*

Messrs. G. McL. Beck, New Zealand Government Railways; H. J. N. Collis, Rhodesia Railways; D. J. Howse, New South Wales Government Railways; S. McC. Mulligan, South African Railways and Harbours; E. Pearce, London Passenger Transport Board; C. C. W. Waterman, and E. A. Woodhouse, L.M.S.R.

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Mr. C. W. Bayne, C.B.E., who, as announced in THE RAILWAY GAZETTE of September 18, recently retired from the position of General Manager, Leopoldina Railway, on account of ill health, has held that position for the past 10 years. He joined the Buenos Ayres Great Southern Railway in 1889, and, after undergoing a course of training, was appointed rates and fares expert, a post he held until June, 1902. He was then offered and accepted the position of Assistant to the General Manager on the Central Uruguay Railway of Monte Video, and was promoted to be Assistant General Manager in November, 1904, and General Manager in October, 1905. In January, 1926, Mr. Bayne resigned from the managership of the C.U.R., on being offered the corresponding position on the Leopoldina Railway, Brazil. This position he held from March, 1926, until August, 1936, but more than once during this period his health showed signs of breaking down, and while he was in England on leave this year he was recommended by his medical advisers to retire.

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INDIAN RAILWAY STAFF CHANGES

Mr. R. de K. Maynard returned from leave and resumed his duties as Acting Chief Operating Superintendent, M. & S.M.R., on October 31.

On return from leave Mr. L. Wilson, Agent, G.I.P.R., resumed charge of his duties on October 9.

Mr. B. Moody, V.D., on return from leave, has been appointed to officiate as Secretary to the Railway Board, as from October 18.

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JUBILEE OF AN ARGENTINE OFFICER

Owing to the pension regulations regarding the retiring age and maximum length of service, it is extremely rare for an Argentine railway employee to complete 50 years of active work. On October 28, however, Señor Justo C. Lavandera, Commercial Assistant to the General Manager of the Buenos Ayres & Pacific Railway, completed 50 years' continuous railway service. He joined the old Buenos Ayres Northern Railway (subsequently incorporated in what is now the suburban section of the Central Argentine Railway) in October, 1886, as a telegraph learner, and worked his way up to be Chief of the Collector's office in the Goods Department; later he was transferred to the ticket office in the Central station. In 1892 Señor Lavandera entered the Chief Accountant's Department of the B.A. & Pacific Railway, where he remained until 1902, when he was placed in charge of the tariffs section of the Traffic Department, occupying the same position after the transfer of this section to the administration in 1912. In 1919 he was in charge of the unification of the tariffs of the Pacific, Argentine Great Western, Bahia Blanca North-West, and Villa Maria-Rufino Railways. On the appointment of Mr. M. F. Ryan as General Manager in 1928, Señor Lavandera was nominated as his Commercial Assistant, which position he has ever since occupied. In addition to his ordinary duties, Señor Lavandera has represented the Pacific Railway on various committees appointed to study questions relating to tariffs and operating, both in Argentina and Chile, particularly in connection with the Transandine Railway. On October 28 he was entertained by the local directors and General Manager of the Pacific Railway at a dinner at the Alvear Palace Hotel, Buenos Aires, at which most of the general managers, local directors, chief officers, and heads of departments of the other railways were present.

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Lt.-Col. T. Gracey, R.E. (ret.), has been elected Chairman and Managing Director of the Rohilkund & Kumaon Railway, as from November 19, in place of the late Sir Henry P. Burt, K.C.I.E., C.B.E.

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We record with regret the death, on November 19, of Mr. T. L. Gilmour, C.B.E., a Director of the Trans-Zambesia Railway.

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INSTITUTION OF LOCOMOTIVE ENGINEERS

The following have been recommended by the council for election:—

*Members*

Mr. H. G. McClean, Manager, Traction Department, Crompton Parkinson Limited and Allen West & Co. Ltd., Chelmsford.

Mr. G. R. Nicholson, Chief Draughtsman, Crewe, L.M.S.R.

Mr. J. W. E. Smith, Research and Experimental Assistant to Chief Draughtsman, Derby, L.M.S.R.

Mr. H. E. T. Vogel, Locomotive, Carriage and Wagon Superintendent, Leopoldina Railway (Brazil).

*Transfers Associate Member to Member*

Mr. C. N. Burns, Superintendent, Power, East Indian Railway.

Mr. G. Collingwood, Assistant Works Manager, Vulcan Foundry Limited, Newton-le-Willows.

Mr. A. A. Howarth, District Locomotive Foreman, Sudan Railways.

Mr. S. T. Willcox, Assistant Mechanical Engineer, South Indian Railway.

*Transfer from Graduate to Associate Member*

Mr. S. Mamlouk, District Locomotive Superintendent, Egyptian State Railways.

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PRESENTATION TO CREW OF L.M.S.R. TRIAL TRAIN

A happy sequel to the L.M.S.R. record-breaking runs described on pages 900-2 took place at Euston on Wednesday, November 25, when a presentation was made on behalf of the Chairman and directors of the company to the four members of the train crew, and to the locomotive inspector responsible for the preparation of the engine. Sir Josiah Stamp, who was supported by members of the board of directors and by the chief officers of the company, in making the presentations, referred to the merits of the achievement. The five recipients, each of whom was presented with an inscribed clock recording particulars of the record runs and the appreciation of the chairman and directors are: Driver T. Clarke, Fireman C. Fleet, Passed Fireman A. Shaw (assistant engineman on the record runs), all of Crewe; Guard F. Howes, of Euston, and Locomotive Inspector S. E. Miller (Willesden).

# Six-hour London-Glasgow-London Trial Runs, L.M.S.R.

Last week we briefly described the objects of the trials which took place over the L.M.S.R. main line between Euston and Glasgow on November 16 and 17, and gave a few details of their achievement, and now by the courtesy of the company we are able to supplement the results then given and publish some of the figures recorded by the dynamometer car and graphs registered by the Hasler speed recorder and the Hallade track recorder.

First, however, it may be noted that, as high average and not maximum speeds were aimed at, the schedule incorporated the now general speed restriction of 90 m.p.h., though in one or two short stretches this figure was slightly exceeded. Owing to the very high average speeds entailed, certain special speed restrictions—not required of normal traffic operation—were imposed, mainly between 60 and 75 m.p.h. It was for this reason that the total, including normal service slacks for junctions, curves, and colliery subsidences, temporary engineering, and these special restrictions, amounted to some 50 reductions of speed in each direction; these are clearly seen as indicated by sudden falls in the speed curves reproduced.

## The Locomotive

No. 6201, *Princess Elizabeth*, the locomotive used, is a standard 4-6-2 (Cl. 7P.) engine built at Crewe works in 1933, to the designs of Mr. W. A. Stanier, Chief Mechanical Engineer. Except for the addition of a Tel RT835 Hasler speed indicator and recorder, no special fittings were made to the engine for the tests. A diagram of the locomotive was published in our issue of June 30, 1933, the only visible modification since being the addition of a steam dome. The principal dimensions are :—

| | |
|---|---|
| Cylinders (4) ... ... | 16½ in. × 28 in. |
| Coupled wheels (diam) ... | ... 6 ft. 6 in. |
| Boiler— | |
| Pressure ... ... | 250 lb. per sq. in. |
| Barrel 20 ft. 4 in. length (20 ft. 9 in. between tube plates) × 5 ft. 9 in. tapering to 6 ft. 3 in. diam. | |
| Tubes— | |
| Superheater elements, 32, 1⅜ in. diam. | |
| Large tubes, 32, 5⅛ in. diam. | |
| Small tubes, 119, 2⅜ in. diam. | |
| Heating surface— | |
| Tubes ... ... ... ... | 2,429 sq. ft. |
| Firebox ... ... ... | 190 ,, |
| Superheater ... ... ... | 594 ,, |
| Total ... ... | 3,213 ,, |
| Grate area ... ... ... | 45 sq. ft. |
| Tractive effort at 85 per cent. B.P., | 40,300 lb. |
| Adhesion factor ... ... ... | ... 3·75 |

| Weights— | Engine tons cwt. | Tender tons cwt. | Total tons cwt. |
|---|---|---|---|
| Empty ... | 94 7 | 27 16 | 122 3 |
| Full ... ... | 104 10 | 54 13 | 159 3 |
| Available for adhesion ... | 67 10 | | |
| Maximum on one axle ... | 22 10 | | |

| Tender | |
|---|---|
| Water capacity ... ... ... | 4,000 gall. |
| Coal ,, ... ... ... | 9 tons. |

This type of engine is designed to be driven with a fully-open regulator in conjunction with an early cut-off.

During the trial runs the steaming of the engine was entirely satisfactory, practically full boiler pressure being maintained throughout; at no stage did it fall below 220 lb. per sq. in., and was repeatedly at blowing-off point. The maximum cut-off used—on the ascent of Beattock bank on the down run—was 37·5 per cent., 35 per cent. sufficing for the ascent of Shap bank, and the normal cut-off on both up and down runs was 15—18 per cent.

The following figures show some of the results of the two runs :—

| | Down run November 16 | Up run November 17 |
|---|---|---|
| Weight of engine and tender, ⅔ coal and water (tons) ... | 150 | 150 |
| Weight of train, inclusive of dynamometer car (tons) ... | 225 | 255 |
| Train miles ... ... ... | 402·1 | 402·2 |
| Ton miles | | |
| Excluding wt. of engine ... | 90,473 | 102,561 |
| Including ,, ,, ... | 150,788 | 162,891 |
| Actual running time in min. | 354·12 | 344·1 |
| Speed (average m.p.h.) ... | 68·2 | 70·15 |
| ,, (maximum m.p.h.) ... | 95 | 94 |
| Coal, excluding shed duties (lb. per mile) ... ... | 46·8 | 44·8 |
| lb. per drawbar horse-power hour ... ... | 3·68 | 3·48 |
| lb. per sq. ft. grate area per hour ... ... ... | 70·8 | 69·9 |
| Water, gallons per mile ... | 34·5 | 30·2 |
| Evaporation (lb. of water per lb. of coal) ... ... | 7·36 | 6·70 |

The power development and operation of the engine on the Shap and Beattock gradients as registered by the dynamometer car, are represented by the figures in the following table :—

| | Down run | | Up run | |
|---|---|---|---|---|
| | Tebay to Shap Summit (5·5 miles) | Beattock to Beattock Summit (10·0 miles) | Lamington to Beattock Summit (13·5 miles) | Clifton and Lowther to Shap Summit (11·3 miles) |
| Average drawbar horsepower ... ... | 1,187 | 1,241 | 1,117 | 1,180 |
| Maximum drawbar horsepower ... ... | 1,251 | 1,350 | 1,260 | 1,260 |
| Maximum calculated indicated horsepower | 2,413 | 2,428 | 2,448 | 2,343 |
| Average speed, m.p.h. ... ... ... | 64·5 | 62·5 | 74·8 | 60·2 |
| Speed at summit ... ... ... ... | 57·0 | 56·0 | 70·0 | 70·0 |
| Boiler pressure ... ... ... | 245 | 240 | 240—245 | 220—240 |
| Cut-off range (per cent.) ... ... ... | 25—32 | 30—37·5 | 20—28 | 30—35 |

The proved ease with which the remarkable results of these runs were achieved speaks volumes for the design and handling of the engine, and a point of interest is that though there was an additional 30-ton load and the weather was inclement and latterly very bad on the up run—as opposed to being fair on the down run—both coal and water consumptions were markedly lower on the return journey.

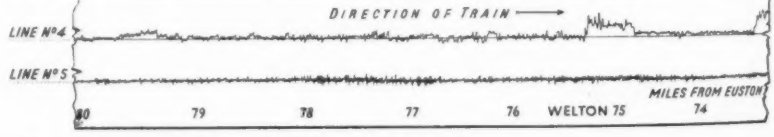
## Permanent Way Research

As has already been stated the running of the coaches at even the highest speeds, was good, but it was, of course, recognised beforehand that very many of the curves, though canted sufficiently for normal running, would be insufficiently canted for the abnormal speeds of the trial runs. It was for this reason that most of the special speed restrictions were imposed for the occasion upon curves known to be particularly deficient in cant for 85-90 m.p.h. speeds.

It was here that the Hallade track recorder provided such valuable information. As previously mentioned, it was functioning in one of the ordinary coaches on the trial train, and proved that in many cases speeds above the limits of the special restrictions were permissible. Also it showed in all cases just what deficiency in cant existed at the higher speeds run. This deficiency was, of course, not responsible for either dangerous or even uncomfortable running, as there is a wide margin between the cant as shown by the Hallade side thrust graph and these unsuitable conditions, a fact that is proved by the smoothness in the negotiation of the curves near miles 75 and 73 shown on the section of Hallade record reproduced below.

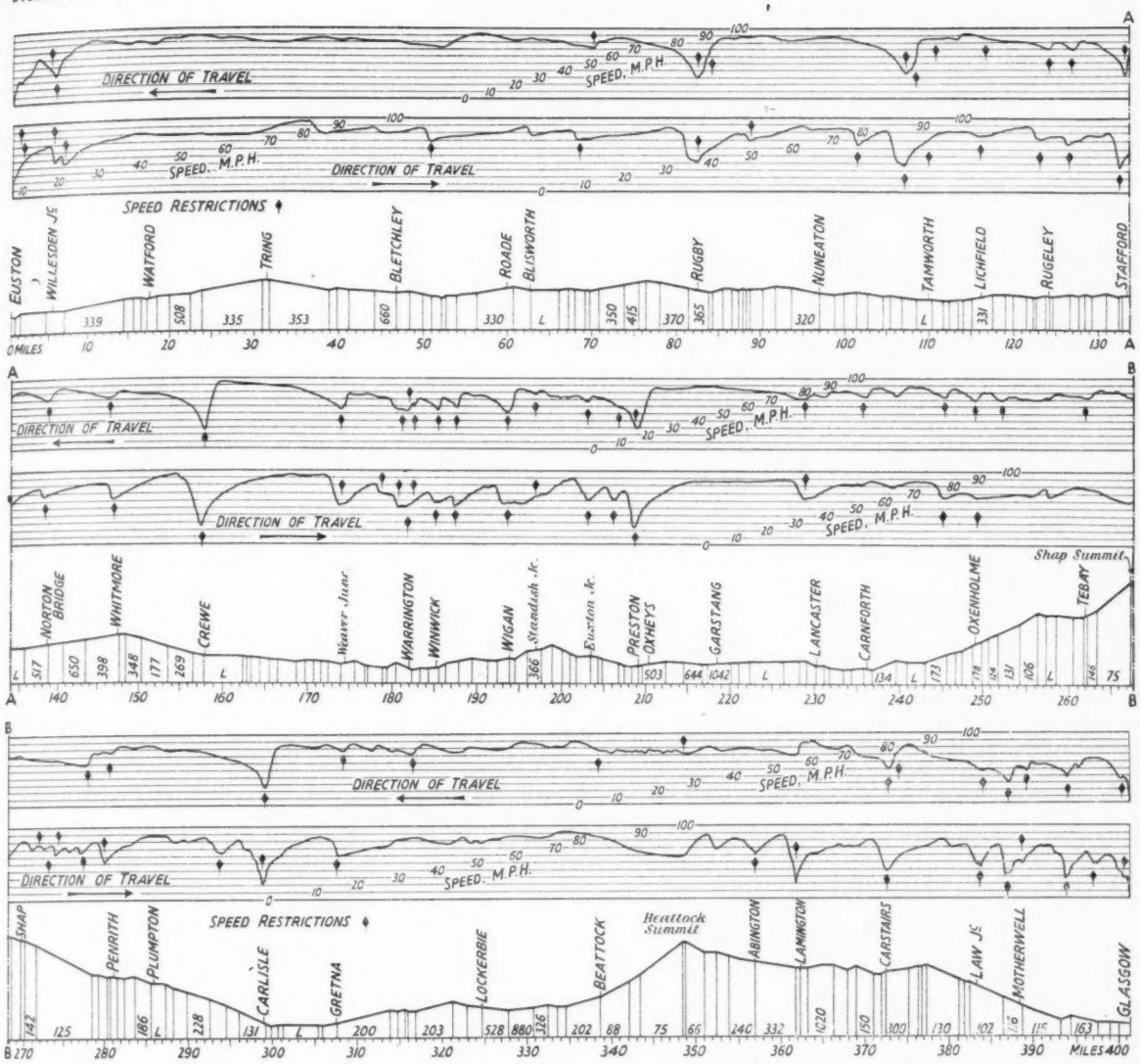
It will be seen that there is no rolling at these points as represented by the roll graph, in line 3.

This section of the record represents conditions on the up run when the




Line 1: figures represent speeds, and the ticks, mileposts, etc.
Line 2: curves and straights (drawn in drawing office).
Line 3: line indicating the actual roll of the coach. Variation of pen from straight × 20 represents amount of roll at roof of coach, or as reproduced ¼ full size, the variation must be × 60.
Line 4: graph showing side thrust on either rail or additional load one rail is carrying as compared with the other. A variation of the pen by $\frac{1}{10}$ in. shows a deficiency in cant of 1 in.
Line 5: an indication of the vertical motion of the coach due to low joints, poor packing, &c., and to the synchronisation of coach springing with these defects.

***Section of Hallade track recorder graphs or chart, reproduced one-third full-size***




***Speed curves of the up and down runs—as recorded by the Hasler instrument—and gradient profile***

It should be specially noted that the diamonds showing the speed restrictions indicate merely the positions of the restrictions and not their extent

train was accelerating—against the grade—from Rugby up to Kilsby tunnel, and then descending the moderately graded bank beyond. It will be noted that in mile 89-79 a curve of 76-ch. radius gave an average deviation of the central pen representing the side thrust, of only about 1·0 or 1·5 tenths of an inch from the straight or datum line, because the speed by then had risen only to 67 m.p.h. or very little above normal. As each tenth of deviation signifies a deficiency in cant of 1 in., it follows that this curve is under-canted for a 67-mile speed by only about 1 in. On the other hand the curve near mile 75, having a radius of 138 ch., showed an average deviation of the side thrust pen amounting to about 2 tenths of an inch, due to a speed of 84 m.p.h. having by then been attained. This curve is therefore under-canted by about 2 in. for so high a speed. The last curve near mile 73, taken at a speed of over 87 m.p.h. showed a still greater deficiency in cant for this even higher speed, as one might expect. The trial runs, providing speeds such as may rule if a six-hour schedule is introduced, have indicated through the Hallade recorder what curves are deficient in cant beyond a reasonable margin of deficiency of, say, 3 in. The engineers, therefore, now know exactly which curves will have to be given extra cant, and its extent, to be suitable for future high-speed schedules; this is one of the ways in which these trials have proved invaluable.

### Features of the Running

The following are some of the outstanding features of the run not brought out in our skeleton logs last week or in the speed curves now reproduced. The 14·3-mile ascent from Watford to Tring on the down journey, culminating in 7 miles of 1 in 335 reduced speed only from 80·4 to 77 m.p.h. Similarly, the seven-mile climb to Roade produced a minimum of 77·6 m.p.h. In fact 77 seems to have been the steady minimum for these Western Section 1 in 330 gradients on both up and down runs. The 90-m.p.h. maximum speed mark was exceeded five times on the down run at Cheddington, before Nuneaton, near Armitage, on the Whitmore descent to Crewe, and again between Crewe and Weaver Junction. Thence to Preston speed restrictions followed one another thick and fast.

The fine efforts up Grayrigg, Shap and Beattock banks have already been referred to, but the cautiousness of the descents from Shap and Beattock and from Carstairs to Glasgow should be specially noted.

### Glasgow to London

On the up run with its additional 30-ton coach and bad weather conditions, cautious running again prevailed to Carstairs, 1½ minutes being dropped

on schedule. The climb to Beattock summit with its minimum speed of 66½ m.p.h. on the final 1 in 99 grade, was, however, the beginning of a magnificent run thence to London. As well as the Shap, Whitmore and Tring ascents and the rise in speed from 90-95 m.p.h. on the level before Crewe, already mentioned, the acceleration from 30 to 79 m.p.h. after the Polesworth slack in a distance of 4·2 miles on slightly adverse grades should be noted; also the overall time of 301 min. 22 sec. for the 367·2 miles from Carstairs to Willesden (over 73 m.p.h.), despite speed restrictions, gradients and weather. Everything, in fact, points to the complete success of these two most interesting and instructive trial runs which reflect the greatest credit upon all concerned.

A subsequent presentation to the train crew is referred to on page 899.

## The R.O.D. Dinner

(*See illustration on page* 897)

Lt. Col. Sir Cecil Paget, C.M.G., D.S.O., presided at the fifteenth annual officers' reunion dinner of the R.E. (Railway Operating Division) which was held on Friday, November 20, at the Trocadero Restaurant, London. Those present were:—

Maj. F. W. Abraham, Capt. G. S. Bellamy, Lieut. S. Booth, Capt. F. L. Castle, Capt. F. S. Chilvers, Capt. C. S. Claxton, Capt. J. Clubley-Armstrong, Capt. H. W. Crosthwait, Maj.-Gen. Sir Sydney D'Aguilar Crookshank, Capt. A. D. Cook, Mr. T. G. Creighton, Capt. A. W. F. Donkin, Maj. C. H. W. Edmonds, Lieut.-Col. J. H. Follows, Capt. C. Grasemann, Capt. R. F. Harvey, Capt. A. T. Haythornthwaite, Maj. A. D. Hunter, Capt. B. H. Harper, Mr. J. A. Kay, Capt. D. R. Lamb, Lieut.-Col. G. S. Lynde, Brig.-Gen. Sir H. Osborne Mance, Col. R. E. L. Maunsell, Maj. J. L. M. Moore, Maj. G. E. Michel, Maj. J. Haggie Patterson, Capt. J. L. Rieter, Capt. M. D. Robinson, Col. Harold Rudgard, Maj. H. G. Scot, Lieut.-Gen. The Hon. Sir Richard M. Stuart-Wortley, Lieut.-Col. R. Tandy, Capt. F. Taylor, Maj. H. G. Thynne, Capt. L. Trevor-Jones, Col. W. G. Tyrrell, Capt. W. C. Williams, and Lieut.-Col. J. S. Wilson.

In the absence of Captain R. M. T. Richards in South Africa, the organisation of the dinner was undertaken by Captain C. Grasemann. Some alterations were made which reduced the attendance as compared with recent years for the reason that it was found that the R.O.D. officers attending last year's dinner were in the ratio of 1 to 4 officers of other units, whereas in 1928 they were evenly balanced. It was felt that the success of the dinner should not be measured by its size, and therefore it was arranged that, in addition to R.O.D. officers, only those connected closely with that Division during the war, viz., the Light Railways and the C.M.E.'s Departments and Railway Signals should be invited. To prevent the possibility of anyone being seated between two people unknown to him it was arranged to allow each R.O.D. officer the privilege of bringing one guest in order to include one or two friends of R.O.D. officers who did not come under the above categories but who had attended the dinners in previous years.

The dinner was followed by a number of informal speeches in the course of which the excellent work performed by the R.O.D. 20 years ago was suitably extolled. Lt.-Gen. Sir R. Stuart-Wortley, in a reminiscent speech, proposed the toast of "The R.O.D.," which was responded to by Lt.-Colonel G. S. Lynde. Capt. J. L. Rieter proposed the toast of "The Chairman," to which Sir Cecil Paget responded. Other brief speeches followed by Brig.-General Sir H. Osborne Mance, Major-General Sir Sydney Crookshank, Colonel R. E. L. Maunsell, Lt.-Colonel J. H. Follows, and Captain Cecil Grasemann.

## Rating of Newcastle Railway Bridge

The House of Lords gave its decision on November 17 in the appeal by the Corporations of Newcastle and Gateshead from a decision of the Railway and Canal Commission which had pronounced that both decks of the Newcastle High Level Bridge formed part of the railway undertaking of the London & North Eastern Railway. The hearing had occupied three days.

Mr. Wrottesley, K.C., who opened the case for the appellants, explained that the bridge was constructed under the Newcastle-upon-Tyne & Berwick Railway Act, 1845. The upper deck was used exclusively for the railway and the lower deck exclusively as a roadway. There was a toll house at each end of the lower deck. For tramcars passing over the bridge the Newcastle Corporation paid the railway company £10,000 a year in lieu of tolls. The northern half of the bridge was in Newcastle and the southern half in Gateshead. From 1850 onwards the halves of the upper and lower decks situated in Newcastle had been assessed as separate hereditaments. Until 1925 the half of the bridge in Gateshead was assessed as one hereditament, but from that year onwards the upper and lower decks of the bridge were separately assessed. After the coming into operation of the Rating and Valuation (Apportionment) Act, 1928, in both Newcastle and Gateshead the upper deck carrying the railway was inserted in the special list as a freight transport hereditament, but the separate assessment of the lower deck remained unaltered. The Railway Assessment Authority constituted under the Railways (Valuation for Rating) Act, 1930, entered the lower deck as a railway hereditament. The two corporations appealed to the Railway and Canal Commission, who dismissed the appeal on the ground that the lower deck of the bridge was occupied by the railway company as part of its statutory undertaking, and was therefore occupied by it for the purposes of its undertaking of a railway company. The appellants contended that the lower deck was an independent and, to some extent, a competitive undertaking.

Mr. Walter Monckton, K.C., for the railway company, contended that the fact that the company was given a right to charge tolls over the lower part of the bridge made it still more part of its undertaking. The company, by the Act which authorised the bridge as part of its undertaking.

Lord Blanesburgh, in delivering judgment on Tuesday (November 17), called attention to the wording of the Act of 1845. As appeared from Section 23 of that Act, the railway bridge had been authorised only on the terms that a roadway for the public benefit should also be constructed as part of it. The tolls which the company was authorised to levy in respect of that roadway, while being a return for the public service rendered, went to increase the general revenue of the company's whole undertaking. The question for decision was whether the lower deck of the bridge was a railway hereditament.

That matter turned on the true effect of Section 1 (3) of the Act of 1930. He agreed with Mr. Justice MacKinnon that the expression "railway hereditament" no less than the word "undertaking" in the connection in which it had to be read in that section was an expression of widest content. In its application to the roadway, it was difficult, with the Act of 1845 in mind, to reach any conclusion other than that the roadway was part of the "principal undertaking" of the company, and was a hereditament occupied for the purposes of that undertaking in the fullest sense of that word. Alternatively, he was prepared to hold that the roadway undertaking was an undertaking "subsidiary or ancillary" to the "principal" or railway undertaking of the company. The appeal should be dismissed with costs. Lord Russell of Killowen and Lord Maugham agreed.

## Railway and Other Reports

**Buenos Ayres & Pacific and Argentine Great Western Railways.**—Announcement is made of the payment of six months' interest to December 31, 1936, on the 4½ per cent. second debenture stock of the Buenos Ayres & Pacific Railway Company, and of the payment of a half-year's interest on the 4 per cent. second debenture stock of the Argentine Great Western Railway Company, which ranks with the aforesaid Pacific stock.

**Atlantic Coast Line Railroad.**—A dividend is announced of $1 on the common stock, the first since 1932, when $2 was paid.

**Hants & Dorset Motor Services Limited.**—An interim dividend of 4 per cent., less tax, on the ordinary share will be paid on November 30.

**British Thomson-Houston Co. Ltd.**—An interim dividend has been declared on the 7 per cent. cumulative preference stock for the half-year ending December 31, 1936, less tax.

## Freight Rebates Scheme Review

The Railway Rates Tribunal (Mr. W. Bruce Thomas, K.C., Mr. H. E. Parkes, and Mr. John Quirey) held on Monday, November 23, a review of the operation of the railway freight rebates scheme for the year ended September 30, 1936. Mr. Alfred Tylor (Mr. Walter Monckton, K.C., with him) appeared for the four amalgamated railway companies. The Mining Association, the Iron and Steel Federation, the National Farmers' Union, and the Ministry of Transport were also represented.

Mr. Tylor explained the exceptional circumstances with which the tribunal had now to deal. It was the first year of the new quinquennium. The assessment of the Southern Railway from April 1, 1931, to March 31, 1936, had been finally fixed by the House of Lords at £1,077,131 and the Railway Assessment Authority had fixed it for the second quinquennium (April 1, 1936 to March 31, 1941) at £1,150,000. The net annual value of the London & North Eastern Railway for the first quinquennium had been fixed by the Railway Assessment Authority at nil, but following discussions between the company and the local authorities concerned a figure of £1,100,000 was agreed, subject to the sanction of the Railway & Canal Commission, and the same figure was proposed for the second quinquennium. The agreed assessments of the London Midland & Scottish Railway were £1,750,000 for the first period, and £1,500,000 for the second; and of the Great Western Railway were £1,650,000 for the first period, and £1,400,000 for the second.

From these figures it was clear that the freight rebates fund was insolvent and would have to pay to the companies £9,750,000, representing the difference between the estimated and actual rate relief received by the companies from 1931 to December of this year. There was a Bill now before Parliament which provided for the liquidation of the debt from the fund to the railway companies by means of a loan. If that Bill became law the considerations with which the tribunal would have to deal would be very different from the present, as there would be changes in the classes of traffic eligible for rebates. If the rate of rebate were altered now the whole matter might have to be reopened in a short time. The railway companies and the other interests concerned accordingly asked the tribunal to continue the rate of rebate at the present level.

Mr. W. V. Wood, Vice-President, L.M.S.R., giving evidence on behalf of the four companies, put in a statement showing that the contributions to the fund by the companies in respect of estimated rate relief for the seven years ended September 30, 1936, totalled £28,725,188. The contributions by the companies in respect of "certified deficiency" for the seven years were £62,643, and interest for the seven years amounted to £198,930. He also submitted a statement showing the position of the fund for the year October 1, 1935, to September 30, 1936. The gross revenue was £4,715,530, of which the companies' contributions in respect of estimated relief were £4,000,000. Net revenue of the fund for the period was £4,612,730, after deducting £60,000 for contingency reserve and £42,000 for administrative expenses. Rebates paid or payable were: agricultural £758,046; coal for shipment and for works, £2,459,547; other industrials, £389,340, making a total of £3,606,933. This left a surplus of £1,005,797.

The railway companies estimated the total rate relief for the next five years at about £2,300,000 per annum. That would involve during the year ending September 30, 1937, a reduction of the present rebates were it not for the proposed legislation. It was, however, possible to bring into the account part of the surplus from the preceding year, to retain the existing rates.

Mr. R. H. Hill, for the Ministry of Transport, supported the application of the railway companies.

The tribunal decided on Tuesday to maintain the present scale.

## Railway Staff and Labour Matters

### Meeting of Railway Staff National Tribunal

As already announced, the Railway Staff National Tribunal will meet in London on Monday, December 7, to hear claims put forward by the Associated Society of Locomotive Engineers and Firemen. Terms of reference have now been agreed between the parties and formal statements of claim and defence have been exchanged between the railway companies and the trade union. It is understood that the following will constitute the tribunal during the consideration of these claims: Sir Arthur Salter, K.C.B., D.C.L. (Chairman), Mr. A. L. Ayre, O.B.E., J.P.—selected by the railway companies; and Mr. H. J. May, O.B.E., J.P.—selected by the Associated Society of Locomotive Engineers and Firemen; the assessors will be Mr. G. L. Darbyshire (Chief Officer for Labour and Establishment, London Midland & Scottish Railway) and Mr. G. H. Tyler (President of the Associated Society). Mr. W. J. R. Squance, General Secretary, will present the case in support of the claims on behalf of the Associated Society of Locomotive Engineers and Firemen, and Mr. Kenelm Kerr, O.B.E. (Assistant General Manager, Staff, L.N.E.R., and Chairman, Railways Staff Conference) will advocate the case of the railways.

### Railway Shopmen—Travelling Time

A case concerning the payment of travelling time came before the Industrial Court on Friday last, November 20, and is dealt with in Decision No. 1,670. The question was brought by the National Union of Railwaymen to the court as a matter of interpretation of Condition 8 of Schedule F of the court's Decision No. 728, which provides that "time occupied in travelling whilst on duty shall be paid for at ordinary day rate, and any time so occupied in excess of the standard daily hours shall be paid for at overtime rate . . . . subject to a maximum period of ordinary day rate and a half."

The parties were in agreement as to the facts of the case, namely, that the man concerned, *i.e.*, an assistant fitter, who was ordinarily employed at Wimbledon, was on June 27, 1935, sent to work at Richmond as an assistant lineman under conciliation grade conditions of employment and was paid travelling time (half an hour each way) under Clause 8, quoted above. This payment was continued until September 19, 1935, on and from which date he was transferred from the Wimbledon depot to the Richmond depot and thereafter payment for travelling time as between these depots was discontinued. On May 24, 1936, he was retransferred from Richmond to Wimbledon. When employed at Richmond he was paid at his shop rate of 35s. 0d. plus 16s. 6d., cost of living bonus, plus 6s. 6d., the difference between his shop rate and the rate of an assistant lineman. He worked 48 hours as against his own shop hours of 47, but received overtime in respect of the additional hour. Whilst employed at Richmond he had free travelling on the railway.

On behalf of the union it was contended that the transfer was of a purely temporary nature and not one in connection with Warwick's ordinary duties. In ordinary circumstances he was entitled to be paid for travelling time if sent away from his home station, and it was submitted that the claim for travelling time, under the condition referred to, is strengthened by reason of the fact that the transfer from Wimbledon to Richmond was temporary.

On behalf of the Southern Railway Company it was submitted that payment for travelling time is required to be made only to men travelling whilst on duty. In the present case it was contended that the allowance for travelling time was only payable so long as the man concerned was stationed at Wimbledon and was required to work temporarily at Richmond, and ceased to be payable when he was stationed at Richmond.

Paragraph 6 of the Decision states that the court is of the view that the allowance provided for in Condition 8 of Schedule F is not one which falls to be made during the period in which the man was stationed at Richmond, and it rules accordingly.

# NOTES AND NEWS

**Another Pickfords Acquisition.**—Pickfords Limited has taken over the goodwill, business, and fleet of Marsh & Sons (1926) Ltd., Southend-on-Sea. The fleet includes four motor vehicles and three trailers.

**Accident on Chicago Elevated Railway.**—By the collision on November 24 of a steel train of the Chicago North Shore and Milwaukee Railroad with a train of wooden coaches on the Chicago Elevated, nine persons were killed and 65 seriously injured.

**French Locomotive Loan.**—The French Eastern Railways have on loan one of the celebrated 4-8-0 Chapelon locomotives of the P.O.-Midi Railway. Trials with 16-car trains weighing 750 tonnes have been made between Paris and Nancy, and further tests may be made with trailing loads up to 900 tonnes.

**Railway Accidents in Czechoslovakia.**—In a collision on November 23 between an express and a goods train at Letovice in Moravia four persons are reported to have been killed. On the same day, a railcar in collision with a railway workmen's train near Trnovce in Western Slovakia caused the death of eight persons.

**New L.M.S.R. Halt in North Wales.**—In order to serve excursion trains running to Llanberis (for the ascent of Snowdon), the L.M.S. Railway opened on Saturday last, November 21, a new halt named Padarn halt. This is about a quarter-of-a-mile from the present Llanberis station, and is within 30 yards of the main road in the middle of the village.

**Empire Air Services.**—Choosing as his subject "Some Aspects of the Organisation of Empire Air Services," Mr. D. H. Handover, Traffic Manager, Imperial Airways Limited, delivered the second Brancker Memorial Lecture to the Institute of Transport in London on Monday last. The lecture described the wide scope of the Imperial Airways organisation.

**The National Omnibus & Transport Co. Ltd.**—In order to repay loans incurred for financing the expansion of the company's interests, the directors of the National Omnibus & Transport Co. Ltd. are making an issue of 200,000 ordinary £1 shares at par, and these are offered to ordinary shareholders registered on November 14 at the rate of one new share for every three ordinary shares held.

**South African-Southern Rhodesia Trade Agreement.**—A Reuters message from Bulawayo, Southern Rhodesia, states that a railway agreement between the Union of South Africa and Southern Rhodesia, is expected to be concluded, which will affect practically the whole of the export and import trade of Southern Rhodesia, and have a stabilising effect on the amount of Rhodesian goods traffic over the South African Railways. The full text of the agreement will probably be published shortly. Negotiations were begun during the recent visit of the Union Minister of Railways and Harbours, Mr. O. Pirow, K.C., to the Victoria Falls.

**Proposed Rome Underground.**—Proposals for the construction of an underground railway in Rome are at present under consideration. It is reported that the estimated cost of the first sections of line likely to be built is in the neighbourhood of £4,000,000 and their length 5½ miles.

**Buenos Aires Co-ordination of Transport Commission.**—A Reuters message from Buenos Aires states that a Decree has been published setting up a commission for the co-ordination of transport services in the Buenos Aires metropolitan area. It is believed that this commission will follow the lines of the London Passenger Transport Board and that its jurisdiction will include the control of over 500 miles of tramways, including the underground sections.

**Newcastle Toll Bridges.**—The Minister of Transport has informed the Newcastle and Gateshead Special Bridges Committee that he is prepared to make a 50 per cent. grant towards the £275,000 scheme to free the High Level and Redheugh bridges from tolls. It appears that the Redheugh bridge can be bought for about £115,000, and that the cost of freeing the High Level bridge is about £160,000. Reference to the rating of the High Level bridge is made on page 902.

**Refrigerated Fish Transport in Germany.**—As an outcome of co-operation between German high sea fishery companies, the German State Railway, and the manufacturers concerned, equipment has been developed for sending fish inland refrigerated by "dry ice" (solid carbon dioxide at —112° F.). The requisite facilities are already available at Wesermünde and Cuxhaven, and are shortly to be provided at Altona-Hamburg. By making it possible to deliver fish in perfect condition anywhere in Germany, the fishery concerns gain a much increased market.

**Railway Telephones.**—At a meeting of the Institution of Railway Signal Engineers, held in London, on Wednesday, November 25, Mr. W. E. Green, L.N.E.R., read a paper entitled "How Telephones Help to Work Railways" (to which reference is made in an editorial article on page 879), accompanied by a number of interesting lantern slides and supplementary information. His presentation of an operating officer's views on the subject was felt to be particularly instructive. The following speakers joined in the discussion: Messrs. F. Downes, J. Holden Fraser, C. A. Brown, H. E. Morgan, H. H. Dyer, W. Challis, B. F. Wagenrieder, and the President, Mr. W. S. Roberts. The next meeting will be on December 16, with a lantern lecture on the history of facing point protection by Mr. R. S. Griffiths, Past President.

**Venezuela Central Railway.**—According to a Reuters message the Venezuelan Government announced on November 24 its intention to take possession of the British-owned Venezuela Central Railway and all its properties. The reason given is "the failure of the company to operate in compliance with its contract." It is understood that the company has encountered great opposition from motor transport on its route, which is from Caracas to Santa Lucia, Santa Teresa to Aponte, and Agua De Maiz to Los Chorros.

**Road Accidents.**—The Ministry of Transport return for the week ended November 21 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year:—

| | Killed, including deaths resulting from previous accidents | | Injured | |
|---|---|---|---|---|
| England .. | 126 | (140) | 3,989 | (3,689) |
| Wales .. .. | 9 | (5) | 158 | (155) |
| Scotland .. | 17 | (19) | 361 | (359) |
| | 152 | (164) | 4,458 | (4,203) |

The total fatalities for the previous week were 164, compared with 164 for the corresponding period of last year.

**Railway Christmas Greeting Posters.**—This year the British Railways have evolved a new scheme for conveying Christmas and New Year greetings to the whole country. The railway staffs at more than 6,700 railway passenger stations, and hundreds of bill-posters, have been requested to display a Christmas and New Year greeting poster carrying the words: "The British railways wish you a happy Christmas and New Year and hope that you and your parcels will travel by rail." All over the country, these new posters will be exhibited simultaneously as far as possible at 9 a.m. on Monday morning next, November 30.

**Baiji-Mosul-Tel Kotchek Railway Construction Inaugurated.**—Travelling by special train from Baghdad to Baiji overnight the members of the Iraq Government witnessed on November 20 the inauguration by the Prime Minister, Seyed Hikmat Sulaiman, of the construction of the important last link to complete the equivalent of the old Baghdad Railway. The new line will run northwards from Baiji, the present Iraq Railways standard-gauge railhead, through Mosul to Tel Kotchek, the temporary terminus of the Anatolian or Istanbul-Aleppo-Syria line followed by the Taurus express, situated on the Syrian-Iraq frontier. The first section from Baiji to Shargat was formerly in operation but has been closed for some time. The new railway will link

up the Iraq and Turkish railway systems and complete the chain from Calais to Baghdad and Basra, with the crossing of the Bosphorus as the only break. The Baiji-Mosul section will first be opened and will give direct rail outlet from the Mosul oilfield.

## Parliamentary Notes

### Railway Freight Rebates Bill

In the House of Lords on November 24 the Railway Freight Rebates Bill was read a second time. The Earl of Erne, explaining the Bill on behalf of the Government, said that it was proposed that the debt of the Railway Freight Rebates Fund to the railway companies should be discharged from the proceeds of an issue of stock by the Railway Clearing House, to be repaid over a period of 16 years. The Bill also proposed that there should be a temporary reduction in the list of selected traffics, so that the reduced sum available for rebates should be concentrated on those traffics assistance to which it was considered would be most helpful to them. He enumerated export coal and milk and live stock as subjects which would receive the benefit. The iron and steel industry, which was comparatively flourishing, would have temporarily to forgo its share of the rebates.

After a short discussion, Viscount Swinton (Secretary for Air) said that the relative claims of the various industries had been carefully considered. The Government had done as much as possible for that section of the coal industry which they thought had the greatest need. There was urgency in regard to the Bill. The issue of stock, about £8,500,000 to £8,750,000, had to be made, and he was advised that it was highly desirable that the issue should be made as near as possible to December 14 or 15. Also, the Railway Rates Tribunal had to meet in order to settle the rates which were shortly to come into force.

The second reading was agreed to.

## British and Irish Traffic Returns

| GREAT BRITAIN | Totals for 47th Week | | | Totals to Date | | |
|---|---|---|---|---|---|---|
| | 1936 | 1935 | Inc. or Dec. | 1936 | 1935 | Inc. or Dec. |
| | £ | £ | £ | £ | £ | £ |
| L.M.S.R. (6,916¼ mls.) | | | | | | |
| Passenger-train traffic... | 394,000 | 380,000 | + 14,000 | 23,429,000 | 22,841,000 | + 588,000 |
| Merchandise, &c. ... | 520,000 | 492,000 | + 28,000 | 22,533,000 | 21,284,000 | +1,249,000 |
| Coal and coke ... | 264,000 | 287,000 | − 23,000 | 11,249,000 | 10,869,000 | + 380,000 |
| Goods-train traffic ... | 784,000 | 779,000 | + 5,000 | 33,782,000 | 32,153,000 | +1,629,000 |
| Total receipts ... ... | 1,178,000 | 1,159,000 | + 19,000 | 57,211,000 | 54,994,000 | +2,217,000 |
| L.N.E.R. (6,332mls.) | | | | | | |
| Passenger-train traffic... | 264,000 | 262,000 | + 2,000 | 15,247,000 | 14,928,000 | + 319,000 |
| Merchandise, &c. ... | 359,000 | 359,000 | — | 15,334,000 | 14,830,000 | + 504,000 |
| Coal and coke ... | 244,000 | 263,000 | − 19,000 | 10,901,000 | 10,496,000 | + 405,000 |
| Goods-train traffic ... | 603,000 | 622,000 | − 19,000 | 26,235,000 | 25,326,000 | + 909,000 |
| Total receipts ... ... | 867,000 | 884,000 | − 17,000 | 41,482,000 | 40,254,000 | +1,228,000 |
| G.W.R. (3,746½ mls.) | | | | | | |
| Passenger-train traffic... | 165,000 | 157,000 | + 8,000 | 9,879,000 | 9,682,000 | + 197,000 |
| Merchandise, &c. ... | 205,000 | 194,000 | + 11,000 | 8,994,000 | 8,626,000 | + 368,000 |
| Coal and coke ... | 110,000 | 119,000 | − 9,000 | 4,717,000 | 4,682,000 | + 35,000 |
| Goods-train traffic ... | 315,000 | 313,000 | + 2,000 | 13,711,000 | 13,308,000 | + 403,000 |
| Total receipts ... ... | 480,000 | 470,000 | + 10,000 | 23,590,000 | 22,990,000 | + 600,000 |
| S.R. (2,153 mls.) | | | | | | |
| Passenger-train traffic... | 252,000 | 236,000 | + 16,000 | 14,496,000 | 14,201,000 | + 295,000 |
| Merchandise, &c. ... | 61,500 | 61,500 | — | 2,956,000 | 2,907,000 | + 49,000 |
| Coal and coke ... | 31,500 | 37,500 | − 6,000 | 1,442,000 | 1,404,000 | + 38,000 |
| Goods-train traffic ... | 93,000 | 99,000 | − 6,000 | 4,398,000 | 4,311,000 | + 87,000 |
| Total receipts ... ... | 345,000 | 335,000 | + 10,000 | 18,894,000 | 18,512,000 | + 382,000 |
| Liverpool Overhead ... (6½ mls.) | 1,163 | 1,100 | + 63 | 56,190 | 55,434 | + 756 |
| Mersey (4½ mls.) ... | 4,312 | 3,950 | + 362 | 191,570 | 188,422 | + 3,148 |
| *London Passenger Transport Board ... | 562,000 | 536,300 | + 25,700 | 11,779,300 | 11,422,800 | + 356,500 |
| IRELAND. | | | | | | |
| Belfast & C.D. pass. (80 mls.) | 1,720 | 1,740 | − 20 | 120,697 | 119,632 | + 1,065 |
| ,, ,, goods | 578 | 534 | + 44 | 25,174 | 24,008 | + 1,166 |
| ,, ,, total | 2,298 | 2,274 | + 24 | 145,871 | 143,640 | + 2,231 |
| †Great Northern pass. (543 mls.) | 7,950 | 7,800 | + 150 | 505,450 | 484,700 | + 20,750 |
| ,, ,, goods | 10,500 | 10,350 | + 150 | 445,150 | 442,600 | + 2,550 |
| ,, ,, total | 18,450 | 18,150 | + 300 | 950,600 | 927,300 | + 23,300 |
| †Great Southern pass. (2,067 mls.) | 26,281 | 25,437 | + 844 | 1,675,903 | 1,622,765 | + 53,138 |
| ,, ,, goods | 59,310 | 56,534 | + 2,776 | 1,983,116 | 1,857,146 | + 125,970 |
| ,, ,, total | 85,591 | 81,971 | + 3,620 | 3,659,019 | 3,479,911 | + 179,108 |

* 21st week. † 46th week.

## British and Irish Railways Stocks and Shares

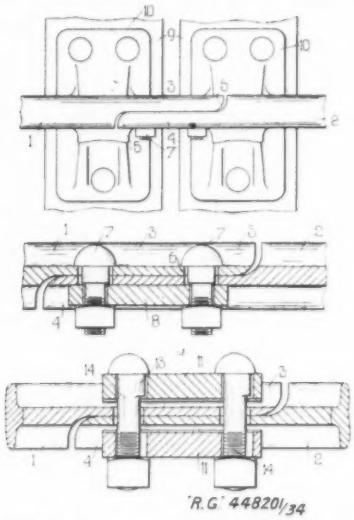
| Stocks | Highest 1935 | Lowest 1935 | Prices Nov. 25, 1936 | Prices Rise/Fall |
|---|---|---|---|---|
| G.W.R. | | | | |
| Cons. Ord. ... | 55½ | 44½ | 61 | −2 |
| 5% Con. Prefce ... | 124 | 108 | 125½ | +½ |
| 5% Red.Pref.(1950) | 117 | 106¾ | 110½ | — |
| 4% Deb. ... ... | 118½ | 108 | 115 | — |
| 4½% Deb. ... | 122 | 110 | 119½ | — |
| 4½% Deb. ... | 129½ | 118 | 127½ | — |
| 5% Deb. ... ... | 140¼ | 130 | 138½ | — |
| 2½% Deb. ... | 82¼ | 68½ | 76½ | — |
| 5% Rt. Charge ... | 137 | 128 | 135½ | — |
| 5% Cons. Guar. ... | 136¾ | 120½ | 133½ | — |
| L.M.S.R. | | | | |
| Ord. ... ... | 25 5/16 | 16 | 32½ | −1½ |
| 4% Prefce. (1923) | 58¼ | 43½ | 81½ | +1 |
| 4% Prefce. ... | 87½ | 73½ | 92 | +½ |
| 5% Red.Pref.(1955) | 107 | 97¾ | 108½ | — |
| 4% Deb. ... ... | 110¼ | 99½ | 110 | −½ |
| 5% Red.Deb.(1952) | 119 11/16 | 111 6/16 | 116½ | — |
| 4% Guar. ... | 105⅝ | 95½ | 105½ | — |
| L.N.E.R. | | | | |
| 5% Pref. Ord. ... | 15⅞ | 8¼ | 12 | −½ |
| Def. Ord. ... | 7 9/16 | 4¾ | 6 | −¼ |
| 4% First Prefce. | 74¾ | 48 | 78 | −½ |
| 4% Second Prefce. | 31¾ | 16¼ | 29 | −1 |
| 5% Red.Pref.(1955) | 92¼ | 71 | 99 | — |
| 4% First Guar. ... | 103 11/16 | 93 | 102½ | +½ |
| 4% Second Guar. | 98¾ | 82½ | 98½ | +½ |
| 3% Deb. ... ... | 86 | 75 | 85 | +½ |
| 4% Deb. ... ... | 109¼ | 98½ | 108½ | — |
| 5% Red.Deb.(1947) | 118¼ | 106½ | 112½ | — |
| 4½% Sinking Fund Red. Deb. | 112½ | 108 | 110½ | — |
| SOUTHERN | | | | |
| Pref. Ord. ... | 87½ | 69¾ | 96½ | −1½ |
| Def. Ord. ... | 25 13/16 | 16¾ | 26 | −1 |
| 5% Prefce. ... | 124 | 108¼ | 125½ | +½ |
| 5% Red.Pref.(1964) | 117¾ | 109½ | 117½ | — |
| 5% Guar. Prefce. | 136½ | 121½ | 133½ | — |
| 5% Red.Guar.Pref. (1957) | 121¼ | 112½ | 117½ | — |
| 4% Deb. ... ... | 116¾ | 107 | 113½ | — |
| 5% Deb. ... ... | 138 | 130¼ | 137½ | — |
| 4% Red. Deb. 1962–67 | 115 | 106½ | 112½ | — |
| BELFAST & C.D. | | | | |
| Ord. ... ... | 9 | 4 | 5⅛ | — |
| FORTH BRIDGE | | | | |
| 4% Deb. ... ... | 111¼ | 104¼ | 105½ | — |
| 4% Guar. ... | 109⅞ | 104 | 105½ | — |
| G. NORTHERN (IRELAND) | | | | |
| Ord. ... ... | 20 | 7 | 12 | — |
| G. SOUTHERN (IRELAND) | | | | |
| Ord. ... ... | 57½ | 14½ | 54 | — |
| Prefce. ... ... | 50 | 25¼ | 65 | +2½ |
| Guar. ... ... | 88¾ | 51¼ | 95 | −½ |
| Deb. ... ... | 86¼ | 70 | 99½ | — |
| L.P.T.B. | | | | |
| 4½% "A" ... | 130 | 119¾ | 126½ | — |
| 5% "A" ... | 139¾ | 130 | 137½ | +1 |
| 4½% "T.F.A." ... | 113¾ | 108 | 111 | — |
| 5% "B" ... | 131½ | 122¾ | 129½ | — |
| "C" ... ... | 109½ | 91 | 97 | −1 |
| MERSEY | | | | |
| Ord. ... ... | 23⅛ | 9¼ | 38½ | — |
| 4% Perp. Deb. ... | 100½ | 93½ | 101 | — |
| 3% Perp. Deb. ... | 75½ | 67 | 76½ | — |
| 3% Perp. Prefce. | 62 | 47¼ | 67½ | — |

# ABSTRACTS OF RECENT PATENTS*

## No. 448,201. Improved Rail Joint

*Sir W. G. Armstrong-Whitworth & Co. Ltd., and George Pawson of Scotswood Works in the City and County of Newcastle-on-Tyne, England.* (*December* 7, 1934.)

In the improved rail joint, one or both ends of the rail lengths 1, 2 are of half width as shown at 3 and 4, and have their edges bevelled as at 5. These half widths are perforated

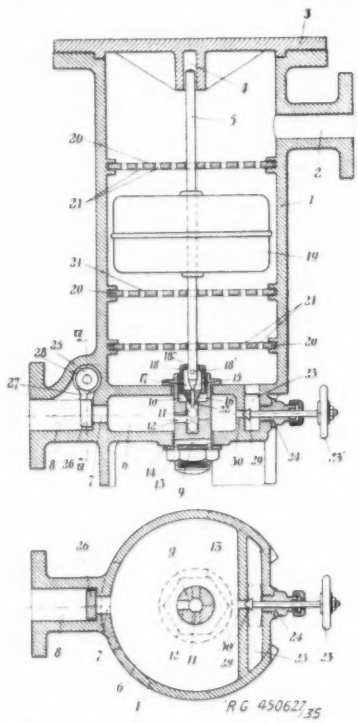



with holes 6 of standard diameter, but elongated into somewhat elliptical shape, to allow of bolting together of the joints by means of bolts 7, but allowing for the expansion of the rails. Washer plates 8 are used as shown. It is essential to support the joint upon a pair of sleepers 9 and chairs 10, the rail ends being secured therein by wooden or metal keys. If desired the rail ends may be connected by means of fishplates cut into halves, thus affording a considerable saving, where these parts are already available. A standard fishplate is cut into two pieces 11 and has the usual pear-shaped bolt holes 12, co-operating with rings 13 on the standard bolt 14 to prevent rotation of these.—(*Accepted June* 4, 1936.)

## No. 450,627. Steam Traps

*Constant Servais and Constant Servais, née Georgine Delrez, both of* 40, *rue des Déportés, Verviers, Belgium.* (*November* 15, 1935.)

In a steam trap intended for separating the water out of a steam circuit automatically, and provided with a float, a draining device comprises a cylindrical body part 1 of metal provided with a pipe fitting 2 for connection to a steam circuit. The body is closed at the top by means of a fluid-tight lid 3 provided centrally with the guide 4 for a steam or spindle 5 placed along the axis of the cylinder. The chamber 6 communicates by means of an outlet 7 with a discharge pipe fitting 8 for the expelled water. The double walls carry a valve seat 9 which is introduced inside the device and secured to the bottom of the water chamber by means of a nut 13. The valve seat comprises the seat proper 10 connected with a canal 11 opening out into another canal 12 which opens out directly into the chamber 6. The spindle 5 carries at its lower end a stop valve 15 disposed in a housing 16, which is the big output valve co-operating with the seat 10. The housing 16

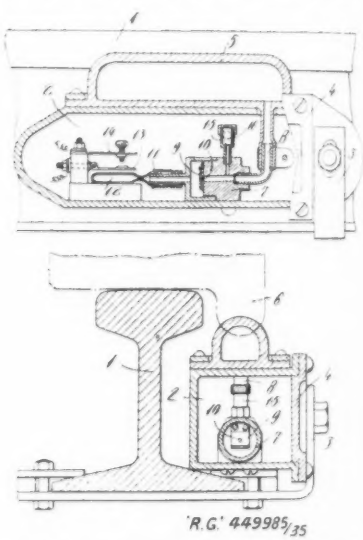



is hollowed inside by a seat 17 continued by a duct 22 in the tip of the housing 16. At the upper part the housing 16 comprises a slide 18 freely traversed by the spindle 5. The float 19 is fixed on the spindle 5 and is calculated to resist the steam pressure. Above and below the float is a rigid horizontal plate 20 in which non-capillary passages or holes 21 are provided. This plate slows down and deviates the steam current coming from 2, and first slides on the full parts provided between the openings. Besides the chamber 6 the draining device comprise a duct 23; a free draining cock 23' is screwed at 24 and provided with a valve 29 which adapts itself on an opening 30 towards the chamber 6. This draining device ensures complete discharge in the case of frost. Further, in the pipe fitting 8 there is provided an automatic closing device for the outlet 7 comprising two discs 25 and 26 united by a part 27. The two discs are disposed in perpendicular planes, and the discs 25 rotates freely in a recess 28 in such a manner that the discs 26 is slightly applied against the outlet 7, which it closes. When water is admitted in the chamber 6 and reaches the outlet 7, the weight of the water and the pressure cause the disc 25 to pivot, and water enters the pipe fitting 8. Any tendency of the water to return is automatically prevented by the disc 26, which closes the passage 7.—(*Accepted July* 22, 1936.)

## No. 449,985. Wheel-operated Switch for Shutting Gates at Level Crossings

*Shichiro Satch, of* 801, *Kamiochiai* 2-*chome, Yodobashi-ku, Tokyo-shi, Japan, and Fumio Shibutani, of* 116, *Tsuruta, Tsuruta-mura, Kitatsugaru-gun, Aomoriken, Japan.* (*July* 26, 1935.)

A wheel-operated, pneumatically actuated, electric switch for use in railway signal or gate-shutting devices at a railway crossing comprises an iron box 2 attached by an L-shaped member 3 to the side of the rail 1, and




provided with a cover 4. A slug-shaped durable rubber bag 5 is provided on the upper plate of the box 2 in such a manner that the flange 6 of a wheel presses on the bag 5 thus causing the air pressure to rise. The air in the bag 5 is connected to the interior of a valve case 7 by a tube 8. A flap valve 9 having a small hole 10 is also provided in the inside of the valve case 7. To this case 7 is attached a tube 11, to the other end of which is attached a flat rubber pouch 12, which is expanded by the compressed

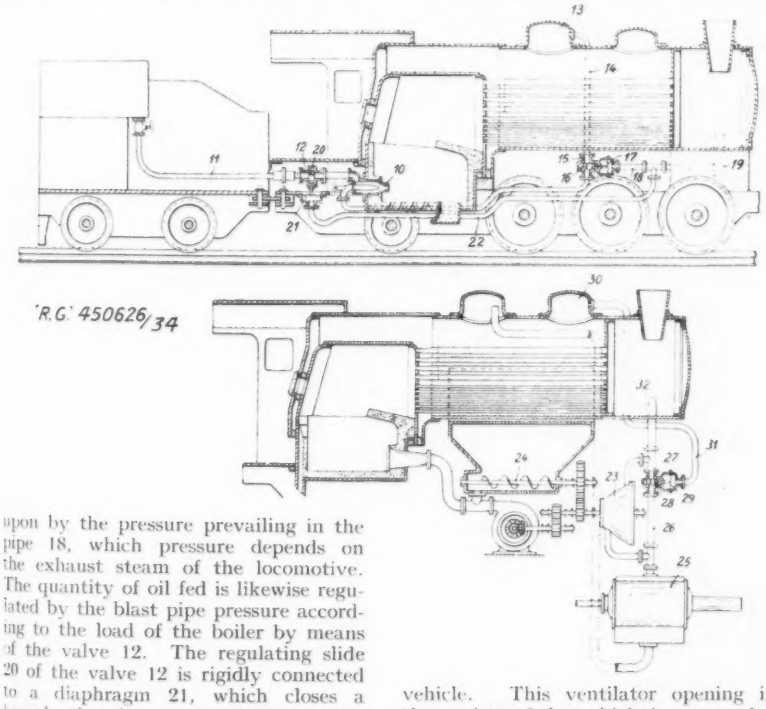
* These abridgments of recently published specifications are specially compiled for THE RAILWAY GAZETTE by permission of the Controller of His Majesty's Stationery Office. Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2 either sheet by sheet as issued, on payment of a subscription of 5s. a group volume, or in bound volumes, price 2s. each, and the full specifications can be obtained from the same address price 1s. each.

air from the bag 5, and thus causes the terminals 13 and 14 to contact with each other, causing the electric circuit to close. A safety valve 15 is filled with a spongy material 16 for allowing any air that may expand due to a temperature rise and thus operate the switch accidentally, to escape. Since the rubber bag is actuated by the flange of a wheel, and since the device is secured to the rail itself, the up and down motion of the rail has no effect on the actuation of the device furthermore as the relative position of the bag 5 to the pouch 12 is kept constant, the connecting tube will not be damaged even if creeping of the rail occurs. When the last wheel of any train has passed over the bag 5, the air expelled from this bag can return gradually through the small hole 10 in the flap-valve 9.—(*Accepted July* 8, 1936.)

### No. 450,626. Improvements in Mechanically-fired Locomotives

*Fried. Krupp A.G., of Essen, Germany, Cast Steel Manufacturers.* (*Convention date, Germany: November* 9, 1934.)

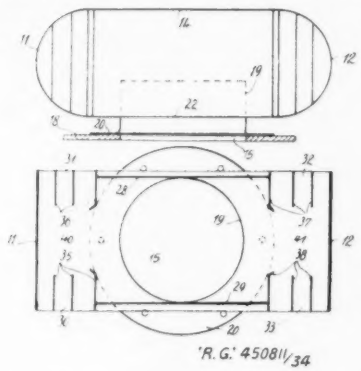
In an oil-fired locomotive, the oil flows to the burner 10 through a pipe 11 including a valve 12. A pipe 14 leading from the boiler 13 to the burner 10 is provided with a valve 15. A diaphragm 17 acting on the slide 16 of the valve 15 is in its turn acted upon by the pressure prevailing in the pipe 18, which pressure depends on the exhaust steam of the locomotive. The quantity of oil fed is likewise regulated by the blast pipe pressure according to the load of the boiler by means of the valve 12. The regulating slide 20 of the valve 12 is rigidly connected to a diaphragm 21, which closes a branch pipe 22 connected to the pipe 18, and is consequently acted upon by the pressure in the blast pipe 19. In an alternative method, the engine 23 driving a fuel-feeding device 24 for supplying dust fuel to the furnace, is a turbine which is directly driven by a portion of the available exhaust steam of the locomotive 25. In order to reduce and increase the quantity of fuel supplied with rising or falling pressure in the boiler, a pipe 26 is arranged in parallel with the turbine 23 driving the fuel-feeding device 24, and carries a valve 27, the slide 28, of which, as in the case of the valves 12 and 15, is connected to a diaphragm 29. The latter closes a pipe 31 coming from the boiler 30. The valve 27 thus causes a quantity of the exhaust steam of the locomotive engine 25, which depends upon the pressure in the boiler to escape directly into the blast pipe 32. Hence the quantity of fuel supplied is diminished with rising pressure in the boiler and, conversely, rises as the pressure falls.—(*Accepted* July 22, 1936.)




### No. 450,811. Ventilators for Vehicles

*Flettnerlüfter G.m.b.H., Laudwitzerstr,* 16-18, *Berlin-Mariendorf, Germany.* (*Convention date, Germany: December* 22, 1934.)

In a ventilator constructed for high-speed vehicles that move backwards or forwards, and which shall offer a minimum of resistance to the air and be absolutely rainproof, the front and back portions are connected by curved plates 11 and 12 constructed so as to reduce wind resistance. Both plates are connected by a plate 14 which is arranged above the opening 15 of the ventilator leading to the interior of the vehicle. This ventilator opening in the roof 18 of the vehicle is surrounded by a sleeve 19 which is attached by a flange 20 to the roof. There is sometimes provided opposite the cover plate 14, a base plate 22, which is combined with the plates 11, 12 and 14 into a closed elongated ring 24, the sleeve 19 opening into the base plate 22. The ring 24, in order to form a rainproof chamber surrounding the ventilator opening 15 and the sleeve 19, is provided with side walls 28 and 29 which leave free air outlet openings 30, 31, 32 and 33. Into these air outlet openings are inserted other plates 35, 36, 37 and 38; passages 40 and 41 are formed between each opposite set of plates, these passages leading to the opening 15. In order to increase the action of the plates lying at the rear, the side walls 28 and 29 of the ring 24 are slightly set back relatively to the plates 11, 14, 12, 22, &c., since by this means the wind strikes in a favourable manner against the rearwardly lying plates 37, 38 and 12. In some cases it will be possible to omit the base plate 22 and draw down the outer plates 11 and 12 directly on to the roof 18 of the vehicle.—(*Accepted July* 24, 1936.)




## COMPLETE SPECIFICATIONS ACCEPTED

449,529. Brown, R. F. Station indicators and departure signalling systems for vehicles

449,658. Pratt, J. H., Manley, G.E., and New-Hudson Limited. Brake mechanisms

449,604. Allen, J. J. Railway points and crossings

449,630. Sandberg, C. P., Sandberg, O. F. A., and Graham, A. J. W. Method of and apparatus for producing straight railway and tramway rails, rolled beams, sections, and the like

449,654. Schwiezerische Lokomotive und Maschinenfabrik. Combined adhesion and rack driving for rail guided vehicles.

449,662. Vereinigt Eisenbahn-Signal-Werke Ges. Signalling systems for giving signal indications on trains controlled magnetically from the track

449,916. Streit, A. P. Devices for lining the holes of railway sleepers for the purpose of taking up the play of chair screws screwed into these holes

449,944. Wohldorf, H. Coupling-devices for vehicles

450,091. Tomlinson, J. Automatic drifting device for locomotives

450,190. Hopkinsons Limited and Brown, R. L. Steam and like valves

450,191. Budd Manufacturing Co., E. G. Railcars

450,451. Armstrong, Whitworth & Co. (Engineers), Ltd., Sir W. G., and Pawson, G. Bogies for rail vehicles and the like

# CONTRACTS AND TENDERS

Hurst, Nelson & Co. Ltd. has received an order from the Assam-Bengal Railway to the inspection of Messrs. Rendel, Palmer & Tritton for 10 MBTP type bogie petrol tank wagons complete with vacuum brake, buffing and drawgear, but without wheels and axles.

W. & T. Avery Limited has received an order from the Indian Stores Department for one five-ton weighbridge complete.

The Baldwin Locomotive Works has received an order from the Chicago, Milwaukee, St. Paul & Pacific Railroad for 30 locomotives.

Usines et Acieries Allard has received an order from the Buenos Ayres Western Railway for 500 cast steel axleboxes for carriages and wagons.

The Gloucester Railway Carriage & Wagon Co. Ltd. has received an order from the London Passenger Transport Board for 25 four-ton permanent-way trucks required for the Engineers' Department.

Ganz & Co., of Budapest, has in hand an order for 50 oil engines of 150-b.h.p. and 20 railcar mechanical equipments for the Roumanian State Railways, and has just received an order from the Hungarian State Railways for two more 275-b.h.p. express railcars.

The Hydraulic Coupling & Engineering Co. Ltd. has received an order for the supply of 18 Vulcan-Sinclair couplings required for the new diesel railcars under construction by Werkspoor for the Netherlands State Railways. Details of these railcars will be found on page 915 of this week's *Diesel Traction Supplement* to THE RAILWAY GAZETTE.

British Timken Limited has secured an order from Harland & Wolff Limited for taper roller bearing driving axleboxes for the two 900-b.h.p. oil-electric locomotives being built in Belfast for the Buenos Ayres Great Southern Railway. Another order has been booked for Timken bearings from the Birmingham Railway Carriage & Wagon Co. Ltd. for the ten articulated railcars being built for the Buenos Ayres Midland Railway.

Beckett, Laycock & Watkinson Limited has received orders for the supply of Solano full-drop metal framed windows with sashes sliding in Silent window channels and balanced with Beclawat No. 7 Lazytong balances, fitted with patent Adjustaboxes for the petrol-engined inspection railcars, which, as recorded in our issue of September 4, have been ordered by the Crown Agents for the Colonies from the Drewry Car Co. Ltd. for service on the Palestine Railways. Beckett, Laycock & Watkinson's Leverlok catches will also be used to enable the windows to be positively locked at the required opening and each car is also to be fitted with four Typhoon half-drop windows of the ame firm's manufacture.

Dow & Wilson, on behalf of Usines Gustave Boel S.A., has received an order from the Buenos Ayres Great Southern Railway for 850 cast steel axleboxes for carriages and wagons.

The Bombay, Baroda & Central India Railway Administration has placed the following orders to the inspection of Messrs. Rendel, Palmer & Tritton :—

Linley & Co. Ltd., four copper firebox plates.
Carters (Merchants) Limited, 300 carriage and wagon axles.
Alldays & Onions Limited, one self-contained electrically-operated positive blower.

### Large American Rail Order

In expectation of a continuation of track improvement programmes and the general advance in speed and service that has occupied American railways for some months, the Pennsylvania Railroad has just placed an order for 100,000 tons of new steel rails, costing about $4,000,000, says Reuters Trade Service from New York.

G. R. Turner Limited has received an order from the West Midland Joint Electricity Authority for 83 20-ton steel coal wagons.

G. R. Turner Limited has also received an order from the Central Argentine Railway for 10 40-ton bogie tank wagons.

The London Passenger Transport Board has placed orders for a total of 300 trolleybuses and equipment divided as follows: Leyland Motors Limited, 150 chassis ; Associated Equipment Co. Ltd., 150 chassis ; A.M.E.T.E. Limited, 300 sets of electrical equipment ; Birmingham Railway Carriage & Wagon Co. Ltd., 100 bodies ; and Metropolitan-Cammell-Weymann Motor Bodies Limited, 200 bodies.

The Consolidated Pneumatic Tool Co. Ltd. has received an order from the Midland Uruguay Railway for an air compressor, paint spraying equipment, and a number of pneumatic tools for workshop use.

The Westinghouse Brake & Signal Co. Ltd. has received an order from the L.N.E.R. for the installation of electric colour-light signalling between Clapton Junction and Chingford. The Chingford branch is 6½ miles long and there are at present six intermediate mechanically-operated signal boxes. The substitution of colour-light signalling for the present mechanical signalling will result in the abolition of the four signal boxes at Hall Farm junction, St. James's Street, Hoe Street, and Chingford goods yard, whilst the signal box at Highams Park will be retained only for working the level crossing gates ; the remaining signal box at Wood Street will be opened occasionally as required to control the points leading to the locomotive depot and carriage sidings. The installation of colour-light signalling will make it possible to augment the present train services by extending to Chingford the trains now terminating at Wood Street.

The Blaenavon Iron & Steel Co. Ltd. has received an order from the Chinese Government Purchasing Commission and to the inspection of Messrs. Sandberg for 30 carriage tyres required for the Canton-Hankow Railway.

Tenders are invited by the Egyptian State Railways Administration, receivable at the Stores Department, Saptieh, Cairo, by December 8, for the supply of two steelyard truck weighbridges.

Tenders are invited by the Bombay, Baroda and Central India Railway, receivable at the White Mansion, 91, Petty France, Westminster, S.W.1, by December 11, for the supply of a quantity of wagon wheels and axles.

Tenders are invited by the Egyptian State Railways Administration, receivable in the Chief Inspecting Engineer's Office, 41, Tothill Street, Westminster, S.W.1, for the supply of one locomotive type boiler. Tenders are also invited, receivable in the Chief Inspecting Engineer's Office, London, for the supply of 2,400 metres of low tension copper cable, 2,800 metres of flex, and a further 900 metres of low tension copper cable.

Tenders are invited by the Madras & Southern Mahratta Railway, receivable at 25, Buckingham Palace Road, Westminster, S.W.1, for the supply of 5,330 steel boiler tubes, 120 steel flue tubes, and 16 steel arch tubes ; 382 steel tyres for locomotives, 400 steel tyres for carriages and wagons ; and 29,000 tie bars for pot sleepers. Tenders for the tubes and tyres are receivable by December 8 and tenders for the tie bars by December 15.

### Locomotives required for Siam

The Superintendent of Stores, Royal State Railways, Siam, invites tenders, receivable by April 28, 1937, for the supply of eight Mikado type locomotives. Blank tender forms may be obtained from Messrs. Sandberg, 40, Grosvenor Gardens, London, S.W.1, and 25, Broadway, New York City, at £4 and U.S. $20, respectively.

The South African Railways & Harbours Administration is calling for tenders (Tender No. 1137) for the supply and delivery of quantities of black bolts, nuts, washers, and rivets. Tenders should be addressed to the Chief Stores Superintendent, Park Station Chambers, Johannesburg, by whom they will be received until December 28.

### British Trade with China

The recently appointed China Committee of the Federation of British Industries held its first meeting on November 25, under the chairmanship of Sir George Macdonogh. Mr. Kirkpatrick, the special representative of the Government's Export Credits Guarantee Department, who is shortly leaving for China, addressed the committee and outlined the prospective range of his activities. The committee had a preliminary discussion on the best methods of co-operation between the various branches of British industry.

# PARLIAMENTARY NOTICE

IN PARLIAMENT
SESSION 1936–37.

## Great Western Railway

NOTICE is hereby given that application is intended to be made to Parliament in the present Session by the Great Western Railway Company (hereinafter referred to as "the Company") for an Act under the name or short title intituled "A Bill for conferring further powers upon the Great Western Railway Company in respect of their own undertaking and upon that Company and the London Midland & Scottish Railway Company in respect of an undertaking in which they are jointly interested and upon the Great Western and Great Central Railways Joint Committee and for other purposes."

A Notice containing a concise summary of the purposes of the intended Act has been or will be published in "The Times" Newspaper of the 1st and 8th December, 1936.

And Notice is hereby further given that maps, plans and sections relating to the objects of the intended Act, together with books of reference to such plans, were on or before the 20th day of November in the present year deposited for public inspection as follows (that is to say):—

(1) As regards the works and lands in the County of Buckingham with the Clerk to the Council of that County at his office at Aylesbury; as regards the works and lands in the County of Middlesex with the Clerk to the Council of that County at his office at the Guildhall, Westminster; as regards the works and lands in the County of Devon with the Clerk to the Council of that County at his office at Exeter; as regards the works and lands in the County of Glamorgan with the Clerk to the Council of that County at his office at Cardiff; as regards the works and lands in the County of Cornwall with the Clerk to the Council of that County at his office at Truro; as regards the lands partly in the County of Worcester and partly in the City and County Borough of Worcester with the Clerk to the Council of the County of Worcester at his office at Worcester; as regards the lands in the County of Pembroke with the Clerk to the Council of that County at his office at Haverfordwest; and as regards the lands in the County of Hereford with the Clerk to the Council of that County at his office at Hereford.

(2) As regards the lands partly in the City and County Borough of Worcester and partly in the County of Worcester with the Town Clerk to the City and County Borough of Worcester at his office at Worcester.

And that copies of so much of the said plans, sections and books of reference as relates to each of the several areas hereinafter mentioned in or through which the intended works are proposed to be made or lands are situate were on or before the said 20th day of November deposited as follows (that is to say):—

As relates to any non-County Borough with the Town Clerk to such Borough at his office; as relates to any Urban District (not being a Borough) or to any Rural District with the Clerk to the Council of such District at his office; as relates to any Parish comprised in a Rural District (other than the Parish hereinafter mentioned) with the Clerk to the Parish Council or if there be no Clerk with the Chairman of that Council or with the Chairman of the Parish Meeting at their respective office or residence; and as relates to the Parish of Powderham with Mr. Sidney Short at his residence.

Printed copies of the Bill for the intended Act may be inspected on and after the 4th day of December, 1936, or copies thereof obtained at the price of three shillings for each copy, at the office of the undersigned Solicitor at Paddington Station, and at the office of the Station Master at the Company's stations at Dawlish, Pyle, Looe, Totnes, Cardiff, Malvern Link, Bourne End and Haverfordwest, and at the joint stations of the Great Western and London Midland & Scottish Railway Companies at Worcester and Hereford, and at the Great Western and Great Central Railways Joint Committee's stations at Denham and Ruislip & Ickenham respectively.

Dated this 26th day of November, 1936.

A. G. HUBBARD,
Great Western Railway Station,
Paddington, W.2.
Solicitor.

C. H. WHITELEGGE,
1, The Abbey Garden,
Westminster, S.W.1.
Parliamentary Agent.

# OFFICIAL NOTICES

## Royal State Railways of Siam

NOTICE.

SEALED Tenders for the supply of Eight Mikado Locomotives will be received by the Superintendent of Stores, Royal State Railways, Bangkok, Siam, up to 14.00 o'clock on the 28th April, 1937, at which hour and date they will be publicly opened in the Superintendent of Stores' Office.

Blank Tender forms are obtainable from MESSRS. SANDBERG, 40, Grosvenor Gardens, S.W.1, and 25, Broadway, New York City, at the price of £4 and U.S. $20.00 per set respectively.

THE ADMINISTRATION ROYAL STATE RAILWAYS.

## Canadian National Railway Company

WELLINGTON GREY & BRUCE RAILWAY COMPANY, 7 PER CENT. BONDS

AT the semi-annual ballot for November, 1936, the following Wellington Grey & Bruce Railway Company 7 per cent. Bonds were drawn, and will be paid at par at the offices of the Canadian National Railway Company in Montreal, Canada, or at Orient House, 42/5, New Broad Street, London, E.C.2, England, on the 1st January next, that is to say, Bonds numbered: 289, 338, 475, 764, 798, 829, 988, 1062, 1067, 1134, 1280, 1600, 1647, 2015, 2077, 2096, 2168, 2195, 2212, 2252, 2336, 2378, 2387, 2990, 3011, 3013, 3043, 3166, 3238, 3245, 3363, 3398, 3413, 3445, 3473, 3484, 3523, 3583, 3672, 3801, 3872, 3907, 3987, 4046, 4058, 4110, 4169, 4171, 4263, 4479, 4494, 4555, 4719, 4850, 4945, 4992, 5105.

In all £5,700 sterling.

Holders of these Bonds will take notice that the interest will cease after 1st January next.

A. H. CONEYBEARE,
European Secretary and Treasurer.

London,
26th November, 1936.

## Canadian National Railway Company

WELLINGTON GREY & BRUCE RAILWAY COMPANY, 7 PER CENT. BONDS

NOTICE IS HEREBY GIVEN that the estimated earnings of the Wellington Grey & Bruce Railway Company for the half-year ending 31st December, 1936, applicable to meet interest on the above Bonds, will admit of the payment of £4 2s. 6d. per £100 Bond, and that this payment will be applied as follows, viz.:—

10s. 3d. in final discharge of Coupon No. 108 due 1st July, 1924; £3 10s. in full settlement of Coupon No. 109 due 1st January, 1925; and 2s 3d. on account of Coupon No. 110 due 1st July, 1925, and will be made on and after 1st January next at the offices of the Canadian National Railway Company, Orient House, 42/5, New Broad Street, London, E.C.2, England.

The coupons must be left three clear days for examination.

A. H. CONEYBEARE,
European Secretary and Treasurer.

London.
26th November, 1936.

## Buenos Ayres Great Southern Railway Company Limited

THE Directors of the Buenos Ayres Great Southern Railway Company Limited hereby give notice that the Register of the Debenture Stockholders will be closed from Friday, the 27th November, to Thursday, the 10th December, 1936, both days inclusive.

By Order of the Board,
N. F. E. GREY,
Secretary.

River Plate House,
Finsbury Circus,
London, E.C.2.
19th November, 1936.



# Forthcoming Events

Nov. 27 (*Fri.*).—Institute of Professional Civil Servants (Session 1936-37) at Lecture Hall, Royal Society of Arts, John Street, Adelphi, W.C.2., 5.30 p.m. "London and London Transport Fifty Years Hence," by Mr. Frank Pick.

Institute of Transport (Manchester-Liverpool), at Exchange Station Hotel, Liverpool, 6.30 p.m. Visit of the President.

Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 6 p.m. "The Air Resistance of Passenger Trains," by Mr. F. Johansen.

Nov. 30 (*Mon.*).—L.N.E.R. Musical Society, at Hamilton Hall, Bishopsgate, London, E.C.2, 8 p.m. Bohemian Concert.

Railway Students' Association (Edinburgh), at Goold Hall, 8 p.m. "Goods Train Traffic Revenue," by Mr. A. Watt.

Dec. 1 (*Tues.*).—Institute of Transport (Bristol), at the University, 6 p.m. Debate: "That the Severn Bridge as Originally Conceived is Necessary both to Local and National Interests." Affirmative: Mr. K. Brown. Negative: Mr. C. Hinman.

Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. "The Lower Zambesi Bridge," by Mr. F. Handman. "The Construction of the Lower Zambesi Bridge," by Mr. G. Howarth.

Dec. 2 (*Wed.*).—Institute of Welding (Midlands), at Cheltenham Technical College. "Oxy-Acetylene Blowpipe Maintenance of Railway Rolling Stock," by Mr. H. Inman.

Dec. 3 (*Thurs.*).—Institute of Fuel, at British Industries House, Marble Arch, London, W.1, 7 p.m. "Steam *versus* Internal Combustion Engines for Road Vehicles," by Messrs. E. Lewis and M. Platt.

Institution of Mechanical Engineers (Scottish), at Royal Technical College, George Street, Glasgow, 7.30 p.m. Second Report of the Welding Research Committee.

Railway Club, at Royal Scottish Corporation Hall, Fetter Lane, London, E.C.4, 7.30 p.m. "A Journey in Scandinavia," by Mr. W. A. Willox.

# Railway Share Market

Uncertainty regarding the latest developments in the European political situation resulted in a reactionary tendency in the stock and share markets. Selling was not heavy, but prices have lost part of their recent gains owing to a falling off in demand.

Prior to publication of the past week's traffics, Home railway stocks were relatively well maintained. The traffic figures were again disappointing owing to a decline in coal receipts, due to the fact that comparison is still with the period last year when there were large movements of coal because of talk of a coal strike. No less favourable views have developed regarding dividend prospects of the junior stocks. On the contrary, there is an increasing tendency to assume that a rather liberal policy may be followed in this respect in view of the anticipated disbursements on account of over-paid local rates. L.M.S.R. ordinary has gone back to 32¾, while the 4 per cent. preference and 1923 preference were also lower at 92 and 82 respectively, at which both would seem to offer attractive yields. Southern deferred have been lowered to 25¾ and the preferred to 96½, although the £10,000 gain disclosed by the past week's traffic return was relatively satisfactory and in accordance with anticipations. L.N.E.R. issues were influenced adversely by the traffic loss of £17,000 for last week. The second preference has now declined to 29½ and the first preference to 79, while moderate losses were again shown by the preferred and deferred stocks. Great Western reflected the general trend to lower prices and is now 61¼, while a slightly reduced price was made by the 5 per cent. consolidated guaranteed stock. Metropolitan stock was also fractionally lower. London Transport "C" remained out of favour, but it is still being pointed out that the yield offered appears not unattractive, and that moderate recovery in price is likely as time proceeds.

Argentine stocks were again the chief centre of interest in the foreign railway market, but best prices have not been held. Central Argentine, B.A. Western and B.A. Gt. Southern were favoured on any reaction in price, but preference and debenture stocks were rather out of favour. B.A. Pacific 4½ per cent. second debentures and Argentine Gt. Western 4 per cent. second debentures did not respond to the interest payments announced this week, as the latter had been anticipated. Cordoba Central first debentures were weak. Elsewhere, Antofagasta were reactionary.

American railroad stocks were dull and lower in most instances, while Canadian Pacific ordinary and preference were dull in sympathy. The 4 per cent. debenture stock has been steady.

## Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

| | Railways | Miles open 1935-36 | Week Ending | Traffics for Week: Total this year | Traffics for Week: Inc. or Dec. compared with 1935 | No. of Weeks | Aggregate Traffics to Date: Totals: This Year | Aggregate Traffics to Date: Totals: Last Year | Aggregate Traffics to Date: Increase or Decrease | Shares or Stock | Prices: Highest 1935 | Prices: Lowest 1935 | Prices: Nov. 25, 1936 | Prices: Yield % (See Note) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | £ | £ | | £ | £ | £ | | | | | |
| South Central America. | Antofagasta (Chili) & Bolivia | 834 | 22.11.36 | 17,390 | + 3,600 | 47 | 648,590 | 585,580 | + 63,010 | Ord. Stk. | 23 | 14 15/16 | 23 | Nil |
| | Argentine North Eastern | 753 | 21.11.36 | 9,500 | + 1,421 | 21 | 196,849 | 173,068 | + 23,781 | ,, | 7 | 4 | 8 1/2 | Nil |
| | Argentine Transandine | — | — | — | — | — | — | — | — | A. Deb. | 49 1/2 | 30 | 50 | 8 |
| | Bolivar | 174 | Oct., 1936 | 5,900 | + 600 | 44 | 63,600 | 60,600 | + 3,006 | 6 p.c. Deb. | 13 | 5 | 7 1/2 | Nil |
| | Brazil | — | — | — | — | — | — | — | — | Bonds. | 14 | 11 | 16 | 3 |
| | Buenos Ayres & Pacific | 2,806 | 21.11.36 | 79,059 | + 6,204 | 21 | 1,578,341 | 1,545,752 | + 32,589 | Ord. Stk. | 10 1/2 | 4 7/8 | 12 | Nil |
| | Buenos Ayres Central | 190 | 7.11.36 | $165,900 | + $47,300 | 19 | $2,686,700 | $2,369,900 | + $316,800 | Mt. Deb. | 21 | 10 | 28 1/2 | Nil |
| | Buenos Ayres Gt. Southern | 5,084 | 21.11.36 | 122,059 | + 4,139 | 21 | 2,334,902 | 2,492,968 | — 158,067 | Ord. Stk. | 27 | 13 1/2 | 25 1/2 | Nil |
| | Buenos Ayres Western | 1,930 | 21.11.36 | 41,882 | — 1,009 | 21 | 844,996 | 826,296 | + 18,700 | ,, | 24 | 10 | 23 | Nil |
| | Central Argentine | 3,700 | 21.11.36 | 128,888 | + 21,250 | 21 | 2,878,017 | 2,463,155 | + 414,862 | ,, | 17 7/8 | 7 | 23 | Nil |
| | Do. | — | — | — | — | — | — | — | — | Dfd. | 9 | 3 1/4 | 12 | Nil |
| | Cent. Uruguay of M. Video | 273 | 14.11.36 | 12,766 | — 1,711 | 20 | 227,165 | 184,867 | + 42,298 | Ord. Stk. | 8 1/2 | 3 | 5 | Nil |
| | Do. Eastern Extn. | 311 | 14.11.36 | 2,662 | + 216 | 20 | 36,386 | 29,341 | + 7,045 | — | — | — | — | — |
| | Do. Northern Extn. | 185 | 14.11.36 | 1,177 | — 200 | 20 | 27,102 | 22,552 | + 4,550 | — | — | — | — | — |
| | Do. Western Extn. | 211 | 14.11.36 | 1,064 | + 172 | 20 | 19,492 | 15,097 | + 4,395 | — | — | — | — | — |
| | Cordoba Central | 1,218 | 21.11.36 | 31,060 | + 1,450 | 21 | 675,020 | 647,960 | + 27,060 | Ord. Inc. | 4 | 1 | 3 1/2 | Nil |
| | Costa Rica | 188 | Sept., 1936 | 14,195 | + 882 | 9 | 52,763 | 43,715 | + 9,048 | Stk. | 35 | 30 | 36 | 5 5/16 |
| | Dorada | 70 | Oct., 1936 | 15,100 | + 3,200 | 44 | 141,700 | 117,400 | + 24,300 | 1 Mt. Db. | 103 5/8 | 102 1/2 | 104 1/2 | 5 1/4 |
| | Entre Rios | 810 | 21.11.36 | 13,812 | + 3,783 | 21 | 265,202 | 243,576 | + 21,626 | Ord. Stk. | 15 | 6 1/2 | 12 | Nil |
| | Great Western of Brazil | 1,082 | 21.11.36 | 12,100 | + 500 | 47 | 368,100 | 361,100 | + 7,000 | Ord. Sh. | 1/2 | 5/16 | 1/4 | Nil |
| | International of Cl. Amer. | 794 | Sept., 1936 | $305,126 | + $20,883 | 40 | $3,929,758 | $3,549,254 | + $380,504 | — | — | — | — | — |
| | Interoceanic of Mexico | — | — | — | — | — | — | — | — | 1st Pref. | 1/2 | 3/32 | 1/2 | Nil |
| | La Guaira & Caracas | 22¾ | Oct., 1936 | 4,305 | + 1,405 | 43 | 45,850 | 37,885 | + 7,965 | Stk. | 8 1/2 | 8 | 5 1/2 | Nil |
| | Leopoldina | 1,918 | 21.11.36 | 22,020 | + 1,140 | 47 | 922,004 | 840,615 | + 81,389 | Ord. Stk. | 8 1/2 | 2 1/2 | 7 | Nil |
| | Mexican | 483 | 21.11.36 | $307,500 | + $17,600 | 21 | $5,397,200 | $5,120,200 | + $277,000 | ,, | 1 1/2 | 1/4 | 5/4 | Nil |
| | Midland of Uruguay | 319 | Oct., 1936 | 8,771 | + 2,167 | 18 | 32,198 | 22,939 | + 9,259 | ,, | 1 1/2 | 1 1/2 | 1/2 | Nil |
| | Nitrate | 397 | 15.11.36 | 6,018 | + 2,145 | 46 | 107,905 | 130,837 | — 22,932 | Ord. Sh. | 64/- | 42/- | 2 5/8 | Nil |
| | Paraguay Central | 274 | 21.11.36 | $2,434,000 | + $611,000 | 21 | $53,495,000 | $45,237,000 | + $8,258,000 | Pr. Li. Stk. | 80 1/2 | 60 | 78 1/2 | 7 5/8 |
| | Peruvian Corporation | 1,059 | Oct., 1936 | 82,605 | + 112 | 18 | 339,051 | 299,665 | + 39,386 | Pref. | 10 5/8 | 6 7/16 | 10 1/2 | Nil |
| | Salvador | 100 | 14.11.36 | c16,200 | + c5,849 | 20 | c222,011 | c236,948 | — c14,937 | Pr. Li.Db. | 65 | 61 | 15 | Nil |
| | San Paulo | 153½ | 15.11.36 | 30,745 | + 11,170 | 46 | 1,341,689 | 1,121,985 | + 219,704 | Ord. Stk. | 80 | 35 | 83 1/2 | 3 |
| | Taltal | 164 | Oct., 1936 | 3,665 | + 275 | 17 | 12,420 | 12,640 | — 220 | Ord. Sh. | 11 1/16 | 11/8 | 1 1/8 | 8 7/8 |
| | United of Havana | 1,353 | 21.11.36 | 13,931 | + 1,609 | 47 | 319,381 | 329,180 | — 9,799 | Ord. Stk. | 3 1/16 | 1 | 2 1/2 | Nil |
| | Uruguay Northern | 73 | Oct., 1936 | 1,162 | + 381 | 18 | 3,751 | 2,578 | + 1,173 | Deb. Stk. | 4 1/2 | 2 15/16 | 5 1/2 | Nil |
| Canada. | Canadian National | 23,613 | 14.11.36 | 742,613 | + 34,365 | 46 | 32,173,117 | 30,029,311 | + 2,143,806 | — | — | — | — | — |
| | Canadian Northern | — | — | — | — | — | — | — | — 4 p.c. | Perp. Dbs. | 78 5/8 | 52 1/2 | 75 1/2 | 5 5/16 |
| | Grand Trunk | — | — | — | — | — | — | — | — | 4 p.c. Gar. | 103 5/8 | 93 | 103 1/2 | 3 7/8 |
| | Canadian Pacific | 17,220 | 21.11.36 | 547,000 | + 6,000 | 47 | 24,551,200 | 22,890,200 | + 1,661,000 | Ord. Stk. | 14 1/16 | 8 5/1 | 14 | Nil |
| India.† | Assam Bengal | 1,329 | 31.10.36 | 42,375 | — 2,050 | 30 | 735,702 | 709,437 | + 26,265 | Ord. Stk. | 92 1/8 | 77 1/2 | 86 1/2 | 3 7/16 |
| | Barsi Light | 202 | 31.10.36 | 2,077 | — 683 | 30 | 65,932 | 79,800 | — 13,868 | Ord. Sh. | 105 | 77 1/2 | 66 1/2 | 7 1/2 |
| | Bengal & North Western | 2,112 | 10.11.36 | 76,060 | + 5,864 | 32 | 299,704 | 260,870 | + 29,834 | Ord. Stk. | 301 1/2 | 291 | 308 | 5 5/16 |
| | Bengal Dooars & Extension | 161 | 31.10.36 | 4,272 | — 1,645 | 30 | 77,941 | 81,066 | — 3,125 | ,, | 127 1/2 | 122 | 120 1/2 | 5 15/16 |
| | Bengal-Nagpur | 3,268 | 31.10.36 | 169,800 | — 24,455 | 30 | 3,476,686 | 3,697,877 | — 221,191 | ,, | 105 | 100 5/16 | 102 1/2 | 3 7/8 |
| | Bombay, Baroda & Cl. India | 3,072 | 30.11.36 | 207,225 | — 34,875 | 34 | 5,122,500 | 4,987,500 | + 135,000 | ,, | 115 1/4 | 110 | 112 1/2 | 5 5/16 |
| | Madras & Southern Mahratta | 3,229 | 31.10.36 | 142,959 | — 1,852 | 30 | 3,114,142 | 3,115,873 | — 1,731 | ,, | 128 1/2 | 113 7/8 | 112 1/2 | 8 |
| | Rohilkund & Kumaon | 572 | 10.11.36 | 11,357 | — 752 | 32 | 47,003 | 45,632 | + 1,371 | ,, | 294 | 262 | 310 | 5 5/16 |
| | South Indian | 2,532 | 31.10.36 | 120,979 | + 14,720 | 30 | 2,379,315 | 2,361,397 | + 17,928 | ,, | 119 3/4 | 104 1/4 | 103 1/2 | 5 5/16 |
| Various. | Beira-Umtali | 204 | Sept., 1936 | 84,059 | + 24,443 | 52 | 803,277 | 769,888 | + 33,389 | — | — | — | — | — |
| | Bilbao River & Cantabrian | 15 | Oct., 1936 | 977 | — 718 | 44 | 14,608 | 15,053 | — 445 | — | — | — | — | — |
| | Egyptian Delta | 620 | 10.11.36 | 9,456 | — 1,272 | 32 | 148,404 | 144,301 | + 4,103 | Prf. Sh. | 2 | 15/8 | 1 3/4 | 5 11/16 |
| | Great Southern of Spain | 104 | 29.8.36 | 568 | — 2,514 | 35 | 33,629 | 62,623 | — 28,994 | Inc. Deb. | 31 1/2 | 2 | 31 1/2 | Nil |
| | Kenya & Uganda | 1,625 | Oct., 1936 | 181,657 | — 11,959 | 44 | 2,129,052 | 2,003,110 | + 125,942 | — | — | — | — | — |
| | Manila | — | — | — | — | — | — | — | — | B. Deb. | 48 | 36 | 46 1/2 | 7 1/2 |
| | Mashonaland | 913 | Sept., 1936 | 120,223 | + 13,530 | 52 | 1,252,141 | 1,384,055 | — 131,914 | 1 Mg. Db. | 104 1/4 | 100 | 103 | 4 7/8 |
| | Midland of W. Australia | 277 | Sept., 1936 | 14,970 | + 820 | 13 | 36,835 | 37,203 | — 368 | Inc. Deb. | 98 3/4 | 93 | 95 | 4 4/16 |
| | Nigerian | 1,905 | 10.10.36 | 35,206 | + 9,394 | 28 | 820,447 | 641,389 | + 179,058 | — | — | — | — | — |
| | Rhodesia | 1,538 | Sept., 1936 | 215,585 | + 22,258 | 52 | 2,291,219 | 2,320,250 | — 29,031 | 4 p.c. Db. | 105 1/2 | 101 | 105 | 3 15/16 |
| | South African | 13,263 | 31.10.36 | 649,851 | + 33,098 | 30 | 18,625,093 | 17,048,889 | + 1,576,204 | — | — | — | — | — |
| | Victoria | 4,728 | June, 1936 | 703,693 | + 16,855 | 52 | 9,689,925 | 9,421,092 | + 268,833 | — | — | — | — | — |
| | Zafra & Huelva | 112 | Sept., 1936 | 6,666 | — 6,193 | 39 | 65,948 | 101,435 | — 35,487 | — | — | — | — | — |

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16.

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rates of exchange and not on the par value.

# Diesel Railway Traction

## Lubricating Oil Problems

OPERATING conditions vary so much from place to place, and even from day to day in the same installation, that it is little wonder numerous difficulties have occurred in the selection of thoroughly suitable brands of lubricating oils in the world of diesel traction. Moreover, lack of agreement as to the necessary properties, even among oil technologists, has not tended to improve matters, and even in the hands of a competent and independent expert a user having two or three makes of engine may not get uniformly successful results. There appears to have been a movement away from the idea that paramount importance should be attached to viscosity, and some technologists have gone so far as to attach merely secondary weight to it. The substitute is found in that property of "oiliness," or the ability of a lubricant to adhere to the rubbing surfaces, but it is not long since we heard an acknowledged authority say that as far as the fluid film state is concerned the viscosity is the dominating characteristic, while another even said that viscosity *was* oiliness. The importance of the adherence characteristic is stressed elsewhere in this issue by a correspondent who is sensible enough to recognise that it is not the be-all and end-all of a lubricant, but that it has a decided advantage in that it determines the most suitable oil from a selection offered for any given duty. If there is truth in the claims he makes for this property and for machines which measure it while eliminating other factors, it should not be a lengthy or expensive matter to determine which is the most suitable of what are considered possible lubricants. Moreover, a field is opened for the successful modification of oils to suit certain specific applications; for example, the addition of an oily compound to lubricants which have lost their natural adhesive properties by over-refinement in an endeavour to achieve stability and a high viscosity index. Definite comparative values also can be obtained between used and reclaimed oils, and oils which have been subjected to accelerated ageing by oxidation in the laboratory can be compared with other samples of the same brand which have been in actual use for a known period.

## Security—and Sleep

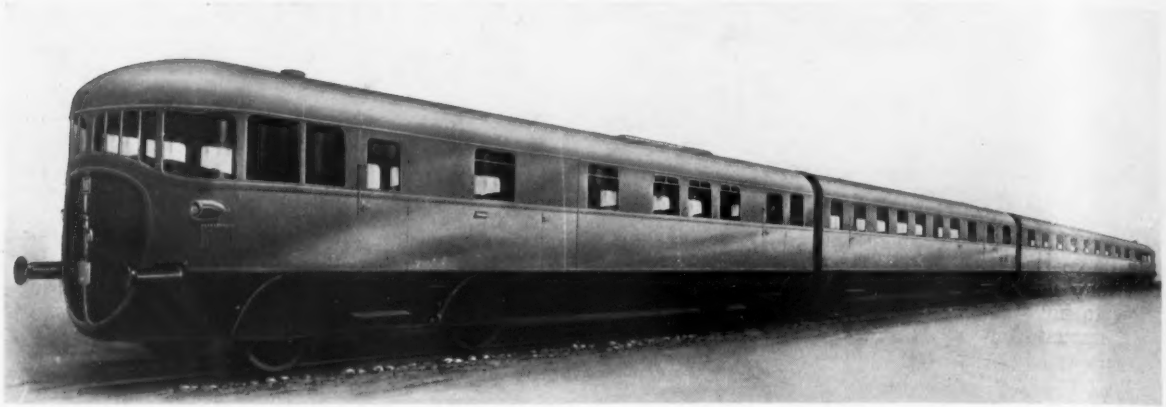
ONCE again the possibilities of diesel traction are being threatened by action on the part of workers' unions to demand that two men be carried on the footplate. This time it is a conference in Paris of the International Transport Federation which has passed a resolution demanding the presence of an assistant driver, not to solve the labour "problem," but merely to safeguard the public! How this is to be done by having two men in the cab is not clear, for all one-man vehicles are fitted with the most modern security devices which safeguard the passengers to a much greater degree than could the presence of a second human being, and in addition have no tendency to go to sleep through sheer boredom. We have no record of any accident which could have been prevented had an assistant driver been present (and assuming that the regular driver had not tampered with the controls). On the contrary, accidents are not unknown where two men have been carried in order to appease the unions, and there have been railway accidents in this country with three men on the footplate. With the presence of two men in the driving cab there is even the danger of each man relying on the other to keep thoroughly awake. Yet a curious point put forward at the Paris conference was that the new types of motive power impose a greater strain on the health and nerves of the workers. We have never heard of a diesel or electric driver wanting to go back to steam, although we have heard many profanations in the opposite direction. Trade unions throughout the world have yet to recognise that constant invention and progress mean more unemployment coincident with greater potential riches for the human race. Just so soon as they awaken to the fact that what their members really want is not *primarily* work but a share in the goods which inventions and machines produce for us, their troubles will disappear, and by their action towards fundamentals they will be able to make a very real contribution to the happiness of their members and civilisation as a whole.

## Railcar Ventilation

BY anyone who has travelled over a number of different railways in various countries, the apparent lack of knowledge regarding the principles of rolling stock ventilation must have been noticed frequently—more often than not by means of bodily discomfort. The proper ventilation of railcars is at once more simple and more difficult to obtain than that of the principal main line trains—simpler because there is only a single vehicle, rarely with more than two saloons, and with power equipment which can be adapted to cope with air conditioning with the minimum of trouble; more difficult because being a vehicle with a small capacity it is more unlikely that extra money will be spent upon it. In certain railcars no attempt has been made to do more than perpetuate the drop light system aided by two or three of the usual roof ventilators, so that if the windows are kept shut for any length of time the car becomes a damp hot-air house, except for icy draughts whistling round the feet. If the windows are open the draught down the floor is lost in the general draught filling the car. For a climate such as that prevailing in Britain, where air-conditioning may not be necessary, much might be done to obtain a constant changing of air without discomfort to the passengers by the adoption of ventilators of the type used with success on the Eastbourne electric trains of the Southern Railway. Simple systems of forced ventilation in conjunction with fixed windows are being used in Central and South Europe; they are reasonably efficacious, and as no effort is made to condition the air other than by simple dust filtering the expense of the equipment is not great. Moreover, in winter these systems as a whole need merely the turning of a valve to re-route the incoming air and pass it over heaters before being led into the passenger saloons. If full air-conditioning is desired a good deal of extra expense is involved, but for single-unit railcars mechanically-driven equipment, such as that evolved by Ganz and applied to the railcars of the Egyptian State Railways, is reasonably light and cheap.

# TRIPLE-CAR SUPER-SPEED TRAINS IN ITALY

***An exclusive description of the latest Fiat de luxe design with mechanical transmission, now going through test runs in Northern Italy***



*Streamlined roller-bearing diesel train of the Italian State Railways*

THE first batch of the nine fully-streamlined triple-car articulated diesel trains ordered by the Italian State Railways early in 1935 has been completed by the Fiat company at its Turin works, and these sets are now making trial runs over the main lines in the neighbourhood of that city.

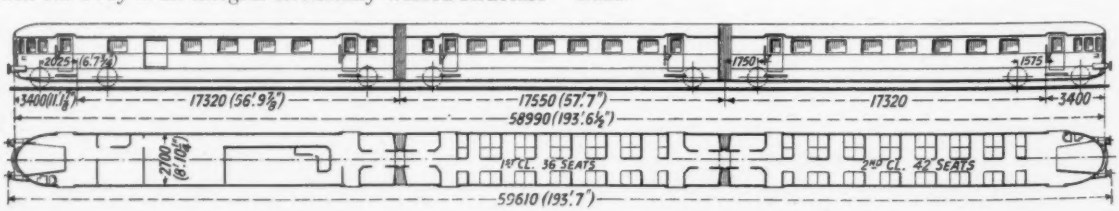
Designed for a nominal top speed of 160 km.p.h. (100 m.p.h.) these nine trains embody several features of more than usual interest as regards European construction, including a completely air-conditioned passenger portion, de luxe accommodation only, and the use of mechanical transmission despite an aggregate engine output of 800 b.h.p. on the continuous rating. The car can be driven in either direction, and as is usual in Fiat practice the driving and engine compartments are not shut off from the adjacent saloons. One of the end vehicles is given over to the engine room, driving position, luggage and mail rooms, kitchen and lavatory; the other end car seats 42 second class passengers, and has a driving position and a light baggage cupboard; the centre vehicle has 36 first class seats, two light baggage cupboards, and a lavatory.

## Mechanical Portion

The bogies are constructed on the welded principle applied by Fiat to the well-known single-unit Littorina cars. The two articulation bogies have a wheelbase of 3·2 m. (10 ft. 5 in.) and their pivots are located midway between the axles. The two end bogies, which carry the engines and gearboxes have a wheelbase of 3·6 m. (11 ft. 9½ in.) and the pivot is to the inside of the wheelbase centre. The wheels themselves are of the disc type and are 910 mm. (35·8 in.) diameter on tread. The framing of each car body is an integral electrically-welded structure of tubular girder form and fabricated of alloy steel. Over headstocks the length of the whole train is 59·19 m. (192 ft.), and the maximum width 2·7 m. (8 ft. 10½ in.). The weight of the train is about 85 tons without any paying load, and about 10 tons more with a full complement of passengers, mails and luggage. On runs corresponding to what will be normal schedules when the trains are in regular service, the fuel consumption is about 1·3 kg. per km. (4·6 lb. per mile). It is intended to run these trains solo, and no provision is made for multiple-unit working; only light buffing and drawgear is fitted.

## Engines and Transmission

Power is provided by two 12-cylinder vee four-stroke Fiat engines, each mounted with its attendant four-speed Fiat gearbox on one bogie frame through the intermediary of rubber cushions. On the continuous rating each engine develops 400 b.h.p. at 1,500 r.p.m., but this is a conservative rating, and the maximum output per engine is 550 b.h.p. at 1,800 r.p.m. At continuous full load and speed and at half load the fuel consumption is 200 gr. per b.h.p. hr. (0·44 lb.) and at 0·75 load it is 190 gr. per b.h.p. hr. (0·42 lb.). The aggregate engine power, corresponding to 9·5 b.h.p. per ton empty on the continuous rating, and 13 b.h.p. at the maximum output, is sufficient to propel the train at a speed of 160 km.p.h. (100 m.p.h.) up a grade of 0·2 per cent. (1 in 500). With 800 b.h.p. total engine output the b.h.p. per seat ratio is 10·2 and the number of *de luxe* seats per ton of empty weight about 0·92. Fan-cooled radiators for the engine circulating water are mounted at each end of the train.




*Design of new diesel-mechanical trains built by Fiat*

# A LIGHT RAILCAR WITH UNUSUAL FEATURES


*120-b.h.p. Verney railcar showing the integral turntable in operation*

AMONG the numerous diesel railcars at work on the French Eastern Railway are four built by the Soc. Verney, which are unusual in being of the six-wheeled type, with one four-wheeled bogie and one fixed axle taking the drive. They operate only on light branch lines and do not haul trailers. They carry their own turntable in the form of a revolving frame secured to the underframe with cramps for fixing to the rails, and they are lifted clear and turned right round, or at right angles if it is desired to run down a crossing track, by means of pneumatic power. This feature does away with the necessity for a driving position at each end, which, in the case of small vehicles, encroaches upon the revenue-earning space to a comparatively great extent and adds undesirable complication and expense to the controls.

The engine is of the six-cylinder Berliet type developing a continuous output of 120 b.h.p. at 1,500 r.p.m. The cylinders have a bore and stroke of 135 mm. by 180 mm. The engine is mounted at the bogie end of the car but drives the single axle at the other end through a Cotal electro-magnetic gearbox and long cardan shafts. The engine carries an electric starting motor and also a dynamo which provides, via a storage battery, current for lighting the interior of the car and the head and tail lamps. The engine cooling water radiator is located in one of the end panels, immediately in front of the engine.

The all steel body is made in three sections; it contains seats for 45 third class passengers and has about 40 sq. ft. of luggage space. The windows are of the drop type, and have spring roller blinds fitted to them. Ventilation is assured by roof ventilators, and heating of the interior is effected by the engine exhaust gases. The leather-covered seats are non-reversible and are mounted on polished tubular steel frames. Light parcel racks are located down each side above the windows, and four small fire extinguishers are secured to the side panels. All the wheels are fitted with air brakes actuating blocks applied to drums inside the wheels. Hand and electro-magnetic brakes are fitted also, and the railcar can be stopped from a speed of 80 km.p.h. (50 m.p.h.) on the level in 140 m. (154 yd.). The top speed with normal engine revolutions is 90 km.p.h. (56 m.p.h.) and up a grade of 1·5 per cent. (1 in 67), 60 km.p.h. (37 m.p.h.). The electro-magnetic brake shoes are two in number, one on each side immediately in front of the driving axle. With a full complement of passengers and mails the weight is 20·2 tonnes, and the tare weight is 16·4 tonnes.

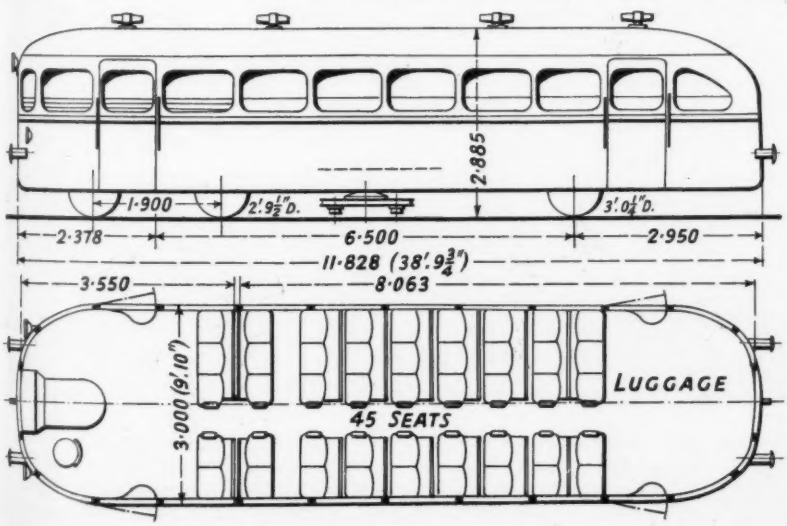


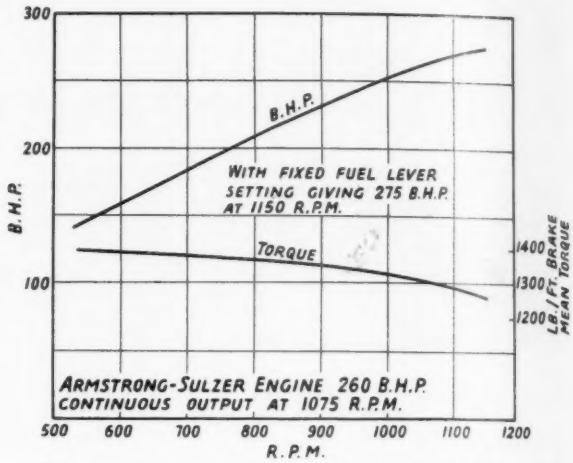

*Diagram of 120 b.h.p. railcar as used for light branch line traffic by the French Eastern Railway. Between the inner bogie wheels and the single driving axle can be seen the turntable which the car carries on its frame, and which can be used to turn the vehicle at points where no turntable is available*

# BRITISH OIL ENGINES FOR CENTRAL ARGENTINE RAILWAY

## *Bogie-mounted units of proved design*

THE four double-bogie railcars and the two twin-articulated train sets now being built at the Smethwick works of the Birmingham Railway Carriage & Wagon Co. Ltd. are being fitted with Armstrong-Sulzer engines. These engines are similar in design to those built by Sulzer Bros., of Winterthur, for the fast, light single-unit railcars of the Swiss Federal Railways, but have been modified somewhat to meet the conditions of operation in Argentina, and are arranged for three-point mounting in power bogies.

In general layout they follow the lines of previous Armstrong-Sulzer engines. They are of the four-stroke six-cylinder in-line type with direct injection, the bore and stroke being 190 mm. by 230 mm. (7·5 in. by 9·1 in.). The continuous output is 260 b.h.p. at 1,075 r.p.m., and the peak load 300 b.h.p. at 1,225 r.p.m. In the Central Argentine installations the maximum output has been fixed at 275 b.h.p. at 1,150 r.p.m. The variation in horsepower and torque is given in the accompanying graph, and supplementary particulars are a brake m.e.p. of 80 lb. per sq. in. and a piston speed of 1,625 ft. per min. on the continuous rating, and 80 lb. and 1,740 ft. per min. on the maximum rating.

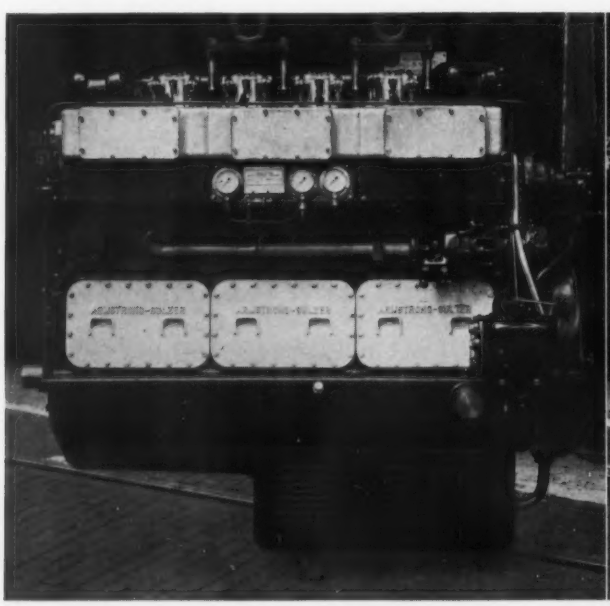



*Horsepower and torque curves of six-cylinder engine for railcar and train applications*

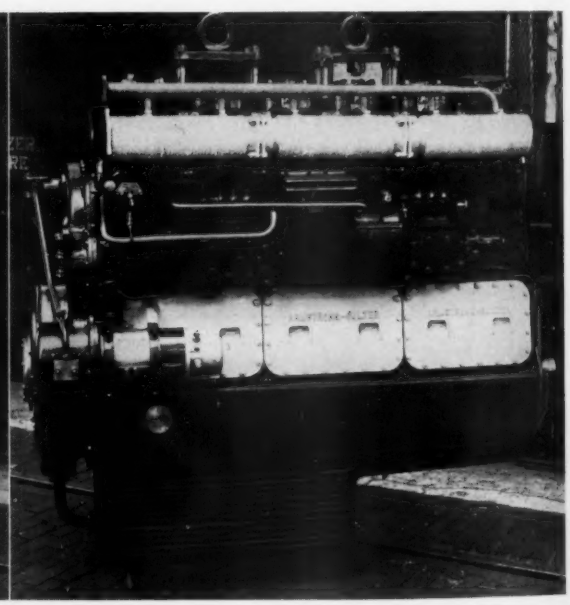
### Cylinder Block and Heads

A single-piece casting forms the cylinder block and incorporates the valve and fuel pump camshaft housings. It is bolted to a fabricated steel crankcase, the lower portion of which is designed to suit the three-point mounting. A large cast aluminium oil sump with outside cooling fins is bolted to the bottom of the crankcase.

The cylinder heads are independent and each houses one inlet and one exhaust valve and carries the rockers for valve operation. The valves are arranged down the longitudinal centre line of the cylinders. The injector is disposed centrally and the valve gear and injector are enclosed by a quickly-removable cover for each cylinder head. Special provision is made for a drain to be brought out from each injector and these drains are grouped in threes, so that any leakage from an injector can be noted. Under each cylinder head cover is a vent pipe leading to the induction port of that particular cylinder head. Lubricating oil is pressure-fed to the valve rocker fulcrums, and from thence through a passage in the valve rocker to the tappet rods, down which it runs to lubricate tap-



*Inlet side of Armstrong-Sulzer 275 b.h.p. railcar engine, showing the twin filter, trunnions for three-point mounting, the location of oil pressure gauges and water pump. Note also the deep, ribbed sump*



*Exhaust side of Armstrong-Sulzer 275 b.h.p. railcar engine, showing the starter motor, injection timing device, Auto-Klean filter (with which is incorporated a small pump for priming the fuel pumps), and the general layout of the governor mechanism*

pets, valve rollers, &c., and eventually drains into the oil bath for the camshaft and cams from which there is an overflow to the crankcase.

The pistons are of aluminium alloy with four compression rings, upper and lower scraper rings and fully floating gudgeon pins. The connecting rods have stepped small-end bearings and four-bolt big-end bearings, whitemetal-lined in bronze shells. Forced lubrication is applied to both ends.

### Crank and Cam Shafts

The crankshaft runs in seven main bearings, the caps of which are held down by bridge pieces cottered into the crankcase structure. The bearings employed are steel shells lined with whitemetal. The crankshaft is a single-piece forging with locating flanges on either side of the rear bearing, and having a flange forged solid at the driving end to which is bolted the flywheel and gear ring for the starter motor. The flywheel is enclosed.

The camshaft, placed high up on the cylinder block, is made in a single piece with hardened and ground cams and journals. It is driven by a train of helical gears from the driving end of the crankshaft and is mounted in a casing along the inlet side of the cylinder block. This casing is fitted with covers so that ready access may be obtained to the camshaft if required, but forms in itself an oil bath in which the cams operate. A separate camshaft in a similar housing on the exhaust side of the engine operates the fuel pumps and governor gear. The fuel pumps are arranged in blocks of three on either side of the governor; their cams are adjustable. In this camshaft a variable injection timing device is incorporated also, and the operating cylinder can be seen to the left of the left-hand block of fuel pumps in the illustration showing the exhaust side of the engine.

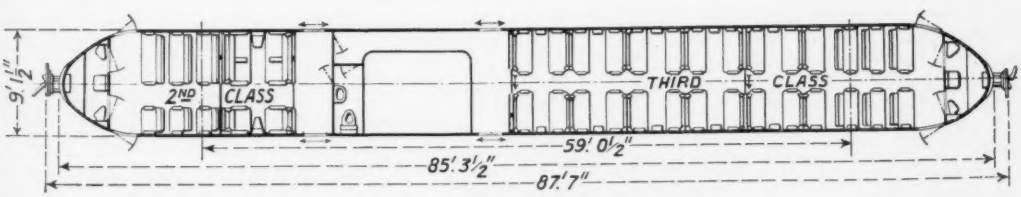
An inlet manifold of box form is mounted along the length of the engine and provides in itself accommodation for the air intake filters; the crankcase breather is also piped to this manifold. The governor is of the servo type, a comparatively small sensitive centrifugal governor being driven direct from the fuel pump camshaft. This governor operates piston valves which admit lubricating oil under pressure to operate the fuel control rod.

The governor is arranged for infinitely-variable speed operation throughout the speed range of the engine, the governor spring tension being increased or decreased by an oil-operated servo piston valve controlled by a Westinghouse infinitely-variable air pressure control from the driver's compartment. Two solenoids are mounted on the governor and provide for stopping the engine and setting the appropriate fuel admission for engine starting. The water circulating pump is gear driven direct from the timing gears and a fuel transfer pump is mounted outside the same gearcase. The lubricating oil pump is mounted within the crankcase and a Duplex oil filter is provided with a manual control valve, enabling one-half of the filter to be isolated and cleaned while the other half is in operation. An Auto-Klean filter is fitted for the fuel supply.

At the moment the test results of five of these engines are available, and they show a remarkable consistency. The average fuel consumption when delivering their top rated output of 275 b.h.p. at 1,150 r.p.m. is 0·40 lb. per b.h.p. hr. and at 75 per cent. output at the same full speed, 0·43 lb. per b.h.p. hr. These figures represent the average consumptions of five engines, each on a six-hour test. The average exhaust gas temperature during these tests was 518° C. and the lubricating oil consumption 1·74 per cent. of the fuel used. The engines ran smoothly over the whole range of speed.

## MORE DIESELS FOR HOLLAND

IN addition to the extended services with the 40-triple-car diesel-electric trains, which are to begin with the 1937 summer timetables as noted elsewhere in this issue, the Netherlands Railways in October of next year will put into commission eight new single-unit oil-engined railcars, the order for which was passed recently. They are intended first for operation on the Alkmaar-den Helder line in north-west Holland, and are to be fitted with automatic centre couplers carrying all the air and control circuits so that two cars may be coupled together and driven by one man.



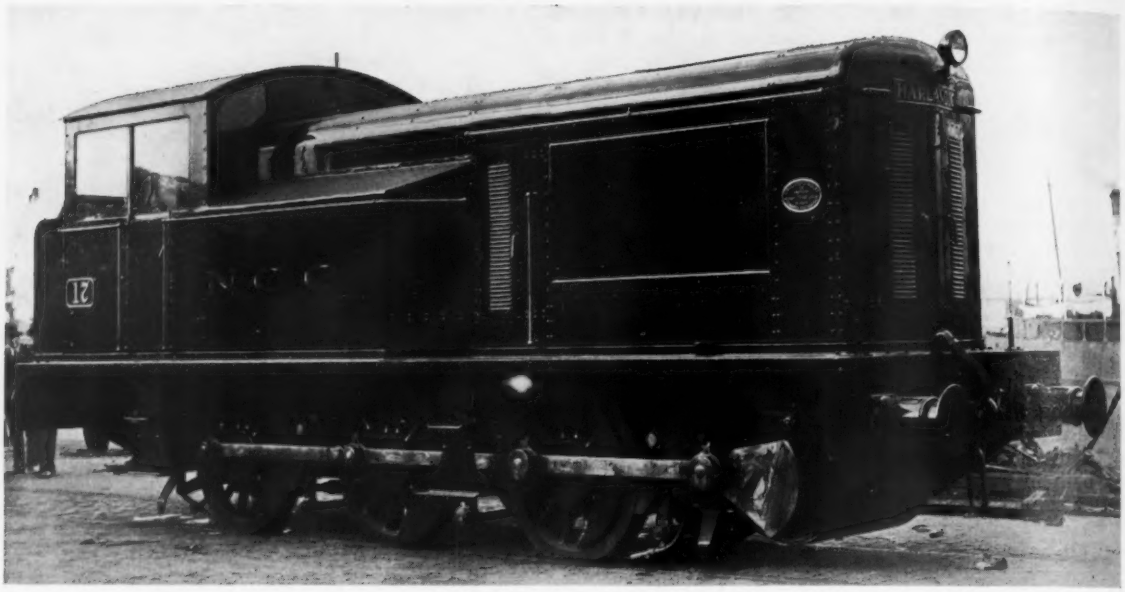

*Floor plan of new railcars for the Netherlands Railways*

Mechanical transmission of the Mylius type is to be incorporated, and it is interesting to remember that it was in Holland, 13 years ago, that the first Mylius gearbox was applied to a railcar. The gear-changing and clutch operation will be on the standard Mylius electro-pneumatic system. Two types of engine are to be used. Five of the cars will be powered by two six-cylinder Stork-Ganz engines developing a maximum of 150 b.h.p. at 1,500 r.p.m., and made by Stork Bros. at Hengelo; the three remaining cars each will be fitted with two Thomassen engines of the same output. Two further Stork-Ganz engines have been ordered as spares. The mechanical portions of the cars are being built at Amsterdam by the N.V. Werkspoor, and the engines will be supported beneath the centre of the luggage room floor (which will be raised). The drives from the engines will be taken to the inner axles of the bogies. A Vulcan-Sinclair fluid coupling is to be fitted between the engine and gearbox.

As shown in the accompanying diagram the cars are to have an overall length of 26·7 m. (87 ft. 6 in.), and in general contour, welded steel body construction, and interior fittings they will be similar to the cars of the 820 b.h.p. articulated diesel trains. The seating capacity is to be 15 second class and 56 third class, and lavatory accommodation is to be provided.

# BROAD-GAUGE LOCOMOTIVE FOR NORTHERN IRELAND

## *Combined hydraulic and gear transmission gives big speed range*




*Diesel locomotive for shunting and branch line service in Ulster*

A SIX-WHEELED diesel locomotive for operation either in shunting or branch line service has been delivered by Harland & Wolff Ltd. to the L.M.S.R. (Northern Counties Committee) to the requirements of Mr. M. Patrick, the Locomotive Superintendent. It runs on the Irish standard gauge of 5 ft. 3 in. and has a nominal top speed of 50 m.p.h.

The mechanical portion generally follows steam locomotive practice. The brakes are of the vacuum type and the force is provided by two 21 in. cylinders beneath the footplate; the exhauster is driven from the shaft of the radiator cooling fan. Access to the engine and transmission is obtained by doors in the sides and front of the engine casing, as well as from the footplate. All controls are duplicated and consist of the throttle, converter and reverse controls, driver's brake valve, and hand-operated sanding gear. A complete lay-out of gauges and tell-tale lamps is provided. Electricity for the battery supplying current to the lighting system and tell-tale lamps is generated by a CAV.-Bosch dynamo mounted on the engine.

Sand-boxes are fitted on both sides of the locomotive, in front of the leading wheels and behind the trailing wheels. An oil stove is provided in the cab for use in cold weather, and is fitted with a hot plate for cooking purposes. The interior of the cab is painted green, with cream upper panels, and the outside of the locomotive is painted standard L.M.S.R. red, lined black and yellow. It is numbered 17 in the N.C.C. list. The main dimensions are indicated on the accompanying diagram. Ballast is incorporated in order to bring the locomotive weight up to 49 tons.

The engine is of the Harland-B. & W. type 8135 PR, and is an eight-cylinder two-stroke unit, developing 330 b.h p. at 1,200 r.p.m. continuously, and 365 b.h.p. at 1,245 r.p.m. on a short-time rating. The cylinders are of 135 mm. bore and 220 mm. stroke (5·3 in. by 8·65 in.). The engine is started by compressed air at a pressure of 360 lb. per sq. in. carried in two bottles on the footplate. One bottle is sufficient to start the engine, the other serving as a stand-by. These bottles are charged, when the engine is running by a two-stage compressor, integral with the engine, and an automatic unloading valve is fitted to throw the load off the compressor when the receiver is fully charged. There is also a stand-by compressor, driven by a petrol-paraffin engine, for use when the main engine is not running.

The radiators are mounted on the sides of the engine casing, and are divided into three sections—one for cooling water, one for lubricating oil, and the third for the transmission converter oil. Air is drawn through the radiators by a large fan driven by shafting from the engine.

### Transmission

From the engine the drive is taken through a speed-increasing gear to the Voith-Sinclair hydraulic torque converter, which runs at 2,005 r.p.m. normal and 2,080 r.p.m. maximum.

The converter casing is divided into two compartments, one of which contains the converter proper, and the other a hydraulic coupling. A lever on the footplate operates a valve communicating with a pair of pistons, both actuating the same piston rod in a chamber in the casing. On air being admitted by the driver to either of them, a piston rod is moved down against a spring, either part or full distance; this allows oil to be delivered under pressure to either the converter or the coupling. In the neutral position no oil is delivered to either, and any oil drains back to the sump.

Between the converter and the gearbox there is a flexible coupling, as there is also between the engine and the

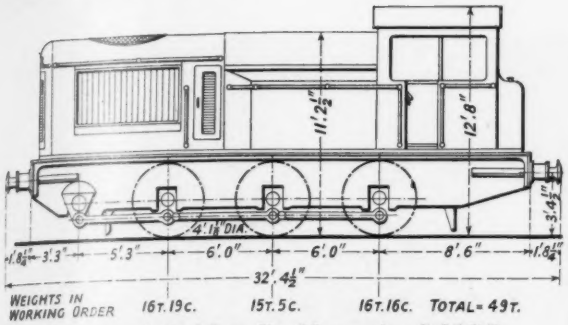
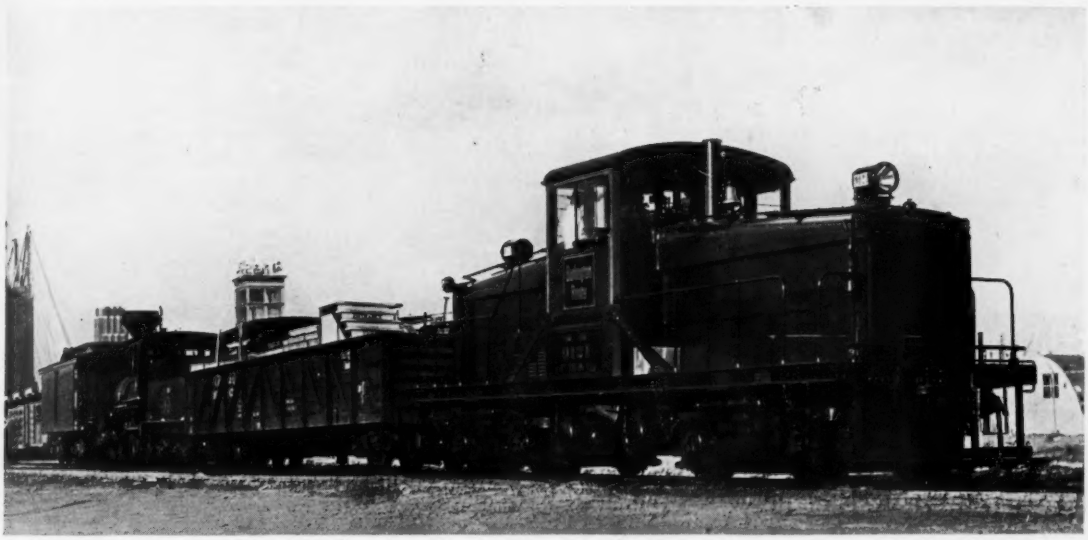



*Diagram of 330 b.h.p. diesel locomotive, L.M.S.R. (Northern Counties Committee)*

speed-increasing gearbox, which is fitted to increase the speed of the torque converter and thus reduce its size. It is of two-speed type so that a wider range of locomotive speeds can be obtained, the complete transmission comprising the turbo-converter and hydraulic coupling and two gear steps in place of the more usual arrangement of a turbo-converter and direct drive. The gearbox contains three shafts, one providing reverse gear by means of the double bevel and sliding dog method; the second provides an arrangement for selecting either high or low gear, and the third is the driving jackshaft. With the bottom step of the gearbox in use the tractive effort is 24,000 lb. maximum, and the top speed 15 m.p.h. With the top gear step the greatest tractive effort is 7,200 lb. and the highest speed 50 m.p.h.

## SHUNTING LOCOMOTIVE OPERATING COSTS

### *Two years' service of three 65-ton units with a maximum tractive effort of 40,000 lb.*



*Heavy diesel-electric locomotive of the Chicago, Burlington & Quincy Railroad*

IN the issue of this Supplement for August 9, 1935, we described the three twin-engined double-bogie shunting locomotives of the Chicago, Burlington & Quincy Railroad, which are powered by two 230 b.h.p. Cummins engines running at 1,000 r.p.m. and which have electric transmission with two main generators and four traction motors. These locomotives, which were built by the Mid-West Locomotive Works, have been in service since 1934 and operating data is now available.

They are assigned normally to 24 hr. a day duties for six days a week, and on the seventh day they are expected to put in 16 hr. Thus only 8 hr. a week are pre-scheduled for maintenance work. Experience over two years has shown that the availability is at least 85 per cent. referred to a 24 hr. a day service for 365 days a year, or approximately 90 per cent. if referred to the actual schedule of 160 hr. a week. Since going into traffic the operating costs taken over the three units, and those of the displaced steam units, are as given in the attached table.

If interest at 4 per cent. were to be added the totals in this table would be 210¼d. per hour for steam and 108d. for the diesel-electric locomotives. In the above comparison the depreciation rate of the diesel has been chosen more or less arbitrarily as twice that of a steam locomotive, but the results these three Mid-West locomotives have given indicate that 8 per cent. is too high a value. Even so, the total operating cost of the diesels is less than half of that of the replaced steam engines. The success of these locomotives has led the Burlington to order a 1,000 b.h.p. shunting locomotive of the same general construction.

COMPARATIVE OPERATING COSTS OF C.B. & Q. R.R. SHUNTING LOCOMOTIVES

| | Steam locomotive | 450 b.h.p. oil-electric locomotive |
|---|---|---|
| Cost per hour— | $ | $ |
| Fuel | 1·438 | 0·229 |
| Lubricating oil | 0·015 | 0·078 |
| Water | 0·110 | — |
| Crew wages | 1·630 | 0·920 |
| Repairs: Running | 0·696 | 0·360 |
| General | 0·180 | — |
| Engine shed expenses | 0·100 | 0·054 |
| Depreciation | 0·046 (4 per cent.) | 0·363 (8 per cent.) |
| Total | 4·215 (208d.) | 2·004 (99d.) |


*FIVE OF THE L.M.S.R. DIESEL-MECHANICAL SHUNTERS IN HUNSLET YARD, LEEDS.* *(See opposite page)*

# THE APPLICATION OF DIESEL ENGINES TO RAIL TRACTION

*By T. HORNBUCKLE, B.Sc., A.M.Inst.C.E., M.I.L.E.,*
*Chief Technical Assistant to the Chief Mechanical Engineer, L.M.S.R.**

THE extent to which diesel engines can be applied to railway work is dependent on the improvements which can be effected in railway operation by their use. Consequently the study of railway conditions is of equal importance to the engineering problem of efficient application of diesel engines to railway vehicles.

Low tractive resistance per ton hauled on rails enables heavy loads to be transported by means of a comparatively small power unit, an advantage particularly marked at low speeds. The effect of gradients on the capacity of the power unit, or alternatively on the maximum load hauled, is most important, and the working conditions are widely different on railways which are fairly level compared with those which are heavily graded.

### Adhesion—Limiting Acceleration and Retardation

An important factor in rail traction is the adhesion which can be obtained between a steel wheel and steel rail. This factor controls not only the tractive effort which can be applied in haulage, but also the retarding effort which can be applied to bring a moving train to rest in the shortest possible distance. Under average conditions we cannot, without danger of slipping the wheels, apply a tractive or retarding effort per axle much greater than 25 per cent. of the axle load. The result is that long distances are required for stopping trains even when all the wheels are braked.

The long distances required for stopping trains have determined the method of control by signal warnings given as much as possible in advance and maintaining clear a controlled section between any two trains on the same track. Present-day methods of controlling train movements have been built up mainly as a result of experience, the object being to obtain under safe working conditions the maximum capacity of line. Modifications of control methods can be undertaken only after careful investigation. Such modifications are usually costly and substantial advantages must accrue if they are to be justified.

An important factor in obtaining the maximum capacity of a line is the minimum time permissible between trains, which is dependent on train speed and the length of the longest section traversed. There is a serious effect on line capacity with marked differences in train speeds, and a further controlling factor is the effect of flat junctions. On busy sections the train workings become extremely complex and in their make-up much practical experience is embodied in addition to office planning. Any interference with these workings has far-reaching results, and the replacement of a daily series of trains with a larger series of different characteristics is difficult, and this is the problem with which a railway operator is faced when he attempts to introduce a new type of unit which runs a faster and more frequent service.

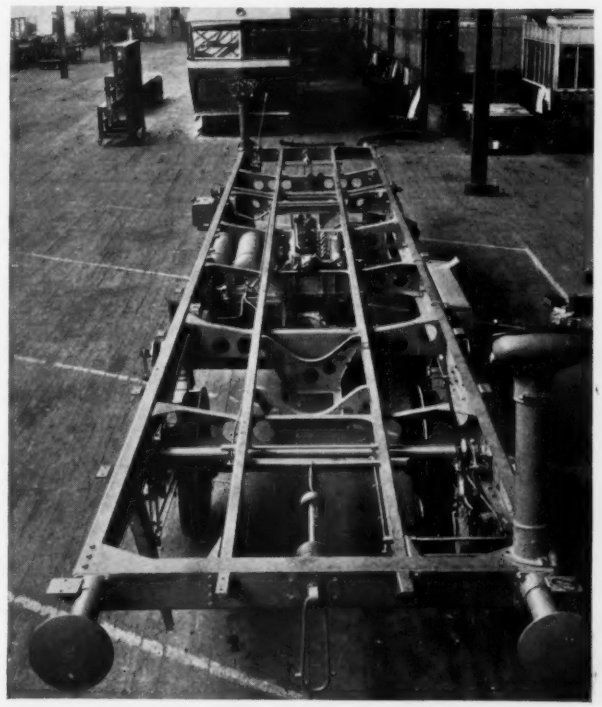
(1) Railways working under conditions unfavourable for steam.
(2) Railcars.
(3) Train sets of 2, 3 or 4 coaches.
(4) Mobile power plants.
(5) (*a*) Locomotives for shunting, (*b*) three-power locomotives.

(1) In countries where steam operation is difficult and costly, due to lack of suitable water and fuel supplies, the introduction of diesel power may enable considerable economies to be effected. The form in which such power is introduced will depend on local conditions, but the best results will not necessarily be obtained by mere substitution of diesel locomotives of similar power to the steam locomotives displaced.

(2) The term "Railcar" is used to indicate a single car designed for running alone, hauling a trailer and/or an occasional vehicle, or in combination with similar cars. Numerous types of railcars are in service, varying from a 'bus on rails to bogie cars capable of hauling one or two light trailers. In many cases considerable success has been achieved, the advantage of one-man operation, reversibility and reduced fuel consumption being clearly demonstrated.

The light weight construction, which is an important factor in securing economy and high performance, introduces difficulties in railway operation. On lines subject to intensive working, the signalling arrangements are highly developed and their operation is dependent to a large extent on the satisfactory working of track circuits. The present design of signalling apparatus is based on experience of working with trains of normal weight; consequently the high degree of reliability necessary in apparatus of this type may not be achieved with railcars of lighter axle load and fewer axles. To overcome this difficulty railcars must be adapted to existing signalling conditions and apparatus is being developed to ensure reliable operation of track circuits by light single vehicles.

It is frequently suggested that railcars designed for light



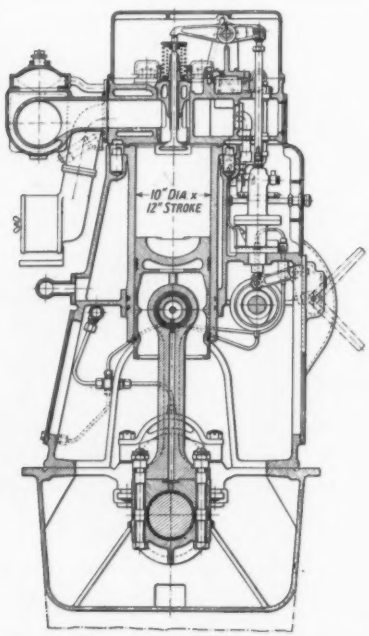
*Welded chassis of 95 b.h.p. Leyland diesel-hydraulic railcar, L.M.S.R.*

* In a paper read before the Diesel Engine Users Association on November 11.

traffic conditions should be confined to use on branch lines, where greater elasticity in working conditions is permissible. In the majority of cases useful branch line services necessitate running into important stations and junctions on which main-line conditions apply. It would appear that successful working of railcars can be achieved only when they are designed for specific working conditions. They may be regarded as special purpose machines, it being difficult to design a single type of unit suitable for general adoption.

(3) Train sets may be made up of two or more railcars arranged for running solo or in multiple unit. Such an arrangement is markedly inferior to a set of coaches designed for permanent coupling and constituting a single unit. In the latter case it is possible to simplify the lighting, heating and braking arrangements, and by suitable arrangement of entrances, exits, lavatories, luggage and driver's compartments, a better utilisation of the floor space is obtained. The power equipment designed for a single train set will be lighter and simpler in arrangement than a number of sets designed for independent working on unit cars, and further simplification can be obtained by articulation.

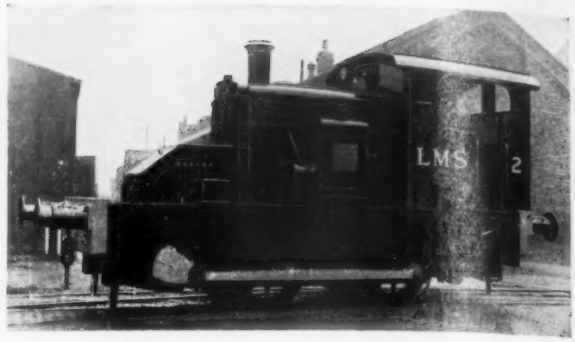
(4) A mobile power plant consists of a diesel engine with its auxiliary apparatus mounted on a truck which can be attached to or detached from a train on which a part of the transmission gear is mounted. The mobile power house is really an electricity generating plant which supplies current to motors mounted on the train. Power is also transmitted to one or more of its own axles to enable it to run under its own power, but a larger proportion of the power generated can be developed at




*Cross-section of* 350 *b.h.p. English Electric diesel engine as used in the* 50*-ton L.M.S.R. shunting locomotives*

the wheels of the train. The most notable application of this method of working is on the Buenos Ayres Great Southern Railway, where 1,700 b.h.p. mobile power plants are attached to eight-coach train sets having a seating capacity of 1,000.

(5) Diesel-electric locomotives capable of displacing high-powered steam locomotives are in operation. They have been built principally for working under conditions unfavourable to steam locomotives. Diesel locomotives of smaller power, designed specially for shunting work, are at the other end of the scale. The conditions of working




88 *b.h.p. Ruston-engined Fowler diesel-mechanical shunting locomotive, L.M.S.R.*

differ materially from the conditions on running lines. The speed of working is generally below 10 m.p.h., and the hours of duty are more continuous. When a locomotive is required on shunting work for the whole of the working week—Monday morning to Saturday night—the fact that the unit can be operated by one man instead of two, and that adequate provision can be made for carrying the fuel and water supplies required for the full week's working, gives advantages of much greater importance than the economies resulting from lower fuel or maintenance costs.

The introduction into a yard of a unit specially designed for shunting brings into prominence questions which may be overlooked while the work is being done by a steam locomotive used also for other classes of work. Such questions are:

(*a*) Speed range, power and tractive effort.
(*b*) Minimum period of service without interruption for taking fuel, water and other supplies.
(*c*) Maximum number of wagons in a shunting raft.
(*d*) The advantages and disadvantages of kicking-up, or fly shunting.
(*e*) Best arrangement of control and brake gear.
(*f*) Best arrangement of driver's cab.
(*g*) Provision of riding steps for shunters.

These are points of general design quite apart from the special problems involved in designing an efficient and reliable arrangement of engine, transmission, and control gear.

The working of trains over short distances between depots and sidings in certain cases may be operated with advantage by diesel locomotives.

## Diesel Engines for Rail Traction

The first essential for any diesel engine for railway work is reliability. This is a dominating factor in all cases where scheduled services have to be maintained, but on railways there is the additional fact that a disabled unit may block the line and cause delays, reacting over a large area. The advances made during recent years in diesel engine design have tended in the direction of improved reliability, and there appears to be no reason why a high standard of efficiency in this respect should not be obtained.

Light weight per b.h.p., though not of importance in all cases, is a factor which will tend to determine the extent to which diesel engines can be effectively applied to railway work. Ease of maintenance, which naturally affects maintenance costs, ranks high in importance. Low fuel and oil consumption are desirable, but must be obtained without any sacrifice in the characteristics above mentioned.

The argument is often put forward that the most suitable type of diesel engine for railway work is the engine

designed to run at a low or moderate speed and of robust construction. There are railway applications for which engines of this type are suitable, but it would appear that any appreciable advance in the application of diesel engines to railway work will depend on utilising the advances made in the competitive forms of transport. If the locomotive on certain classes of train can be abolished by the substitution of light power equipments mounted on the load-carrying vehicles, a wider field of application will be opened out.

### Transmission

The method of transmission is of primary importance. The most successful method has been electrical transmission, a result to be anticipated from the fact that it has been well tried out on electric railways and practically all the detail parts have been standardised and are in production. This method of transmission has marked advantages from the point of view of elasticity.

Mechanical transmission has no comparable advantages derived from previous use. Successful applications of mechanical transmission are now being made in which 300 to 400 b.h.p. is developed. The hydraulic coupling has proved a useful adjunct in connection with change-speed gears, assisting starting from rest and giving protection against severe shock. It is being realised more clearly that the satisfactory working of gear transmissions is largely dependent on the correct selection of the number of speed changes and their ratios. Torque converters which permit direct coupling in the higher part of the speed range have the advantage of simplicity in operation and control and protection from shock effects.

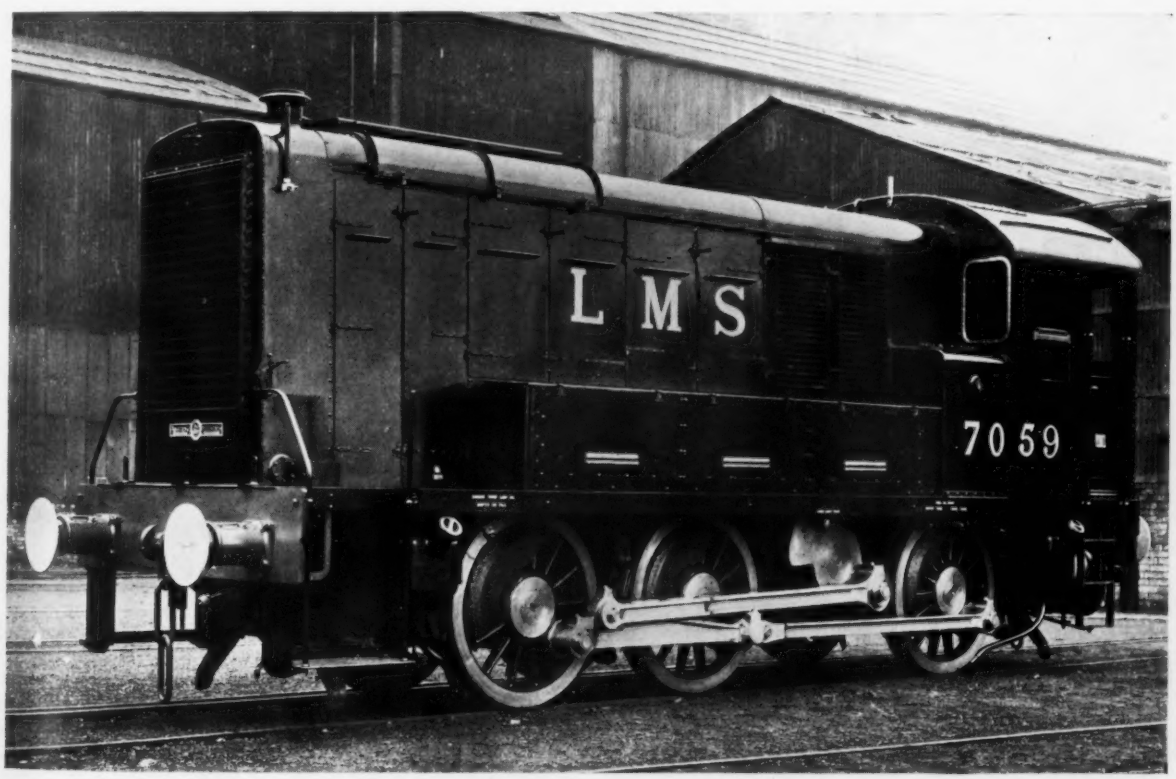
It appears probable that there is a wide field of usefulness for transmission of the mechanical type which will be increased by the use of high-speed engines. An outstanding advantage of mechanical transmission is that its maintenance is more readily undertaken by the steam locomotive maintenance organisation than is the case with electrical equipment.

### General Review

There is a danger of development being extended too far on a haphazard basis, instead of being directed along lines likely to secure the greatest measure of improvement in the utility of the railway. Such improvement can be effected only by close coöperation between railways and manufacturers. Real progress is most likely to be achieved from a long-range study of railway development as a whole and determining what part can be taken by the diesel engine in effecting possible improvements, and the following points are suggested as worth consideration.

To what extent can locomotives be displaced by power equipments mounted on the pay load carrying vehicle? A feature of present-day conditions is the number of trains of two or three coaches being hauled by locomotives of equal or greater weight than the coaches attached. To what extent can one-man-operated reversible train sets be used with advantage?

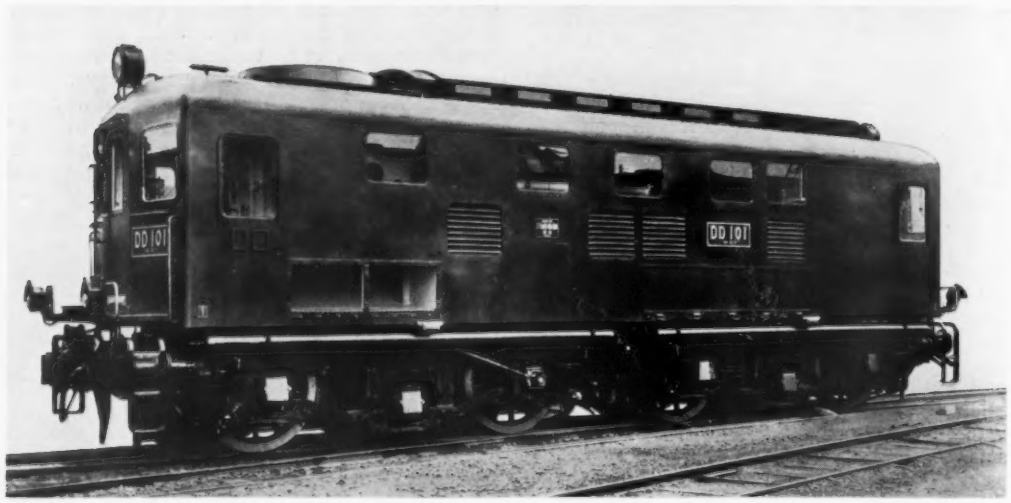
In yard shunting, what advantages can be obtained from the provision of a one-man-operated unit capable of being kept in service for long periods, shut down and returned to service at a moment's notice? To what extent can damage to goods in transit be reduced by the use of such specially designed units? What types of diesel engine and transmission will be most suitable, not only for this particular work, but in view of standardisation with engines suitable for other applications? To what extent can the working of electric trains be extended over non-electrified sections by the provision of mobile power plants? Are railway conditions likely to be more conveniently met by a number of engines of moderate power or by a smaller number of high power units?




350 *b.h.p. Armstrong-Whitworth diesel-electric locomotive, L.M.S.R.*

# JAPANESE LOCAL FREIGHT DIESEL LOCOMOTIVES

## *New design for State Railways*




*500 b.h.p. oil-electric freight locomotive built in Japan*

IN 1929 the Japanese Government Railways purchased a 1-C-1 diesel-electric freight locomotive of 600 b.h.p. which was built by the Maschinenfabrik Esslingen and fitted with a 600 b.h.p. M.A.N. engine and Brown Boveri electric transmission. Two years later a similar locomotive but with a Krupp supercharged engine and Krupp mechanical transmission was put into traffic, and comparative trials were instituted with the two types. From that time until the beginning of the present year no further diesel locomotives of any size were built for the State Railways, although several of smaller output have been built within the last four years.

During the course of the past ten months three Japanese-built oil-electric locomotives have been introduced into short-distance freight traffic on the standard 3 ft. 6 in. gauge lines in the Kobe district. Although embodying the results of experience gained with the Esslingen and Krupp locomotives, they have been developed more directly from the two double-bogie freight locomotives (with M.A.N. and Sulzer engines) which have been running for five years

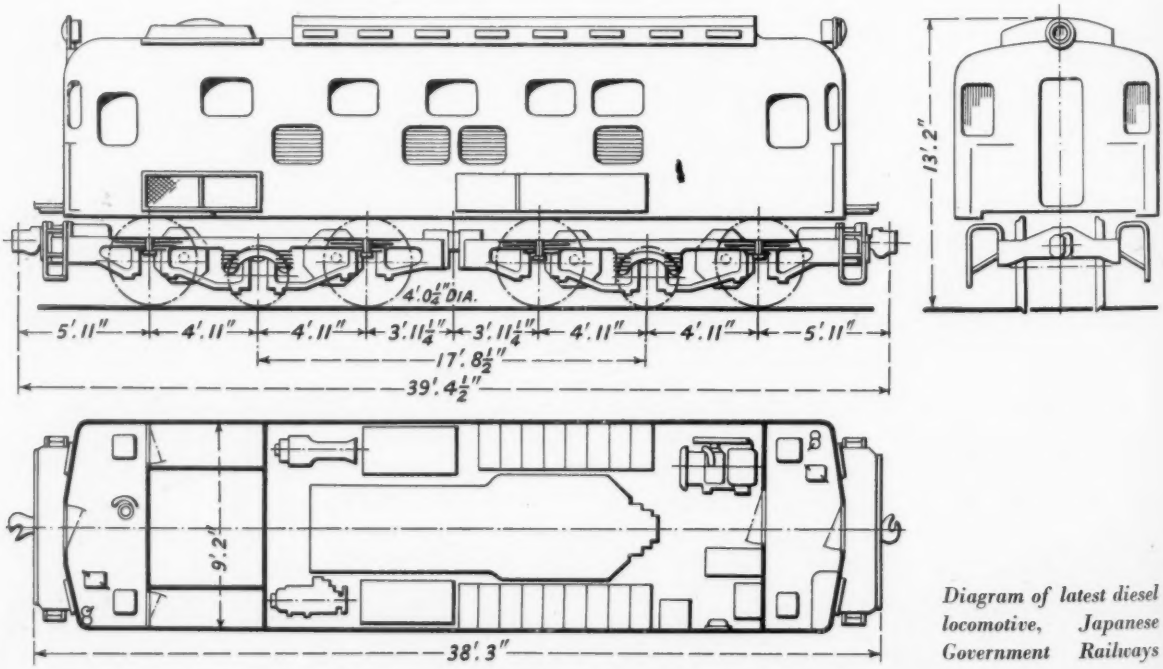
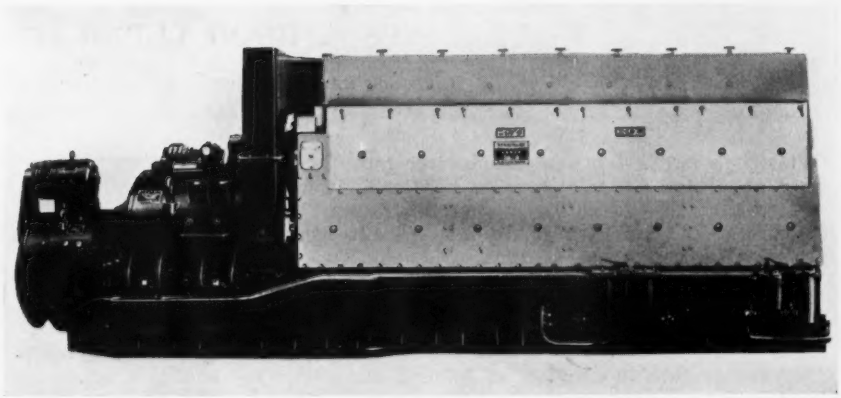
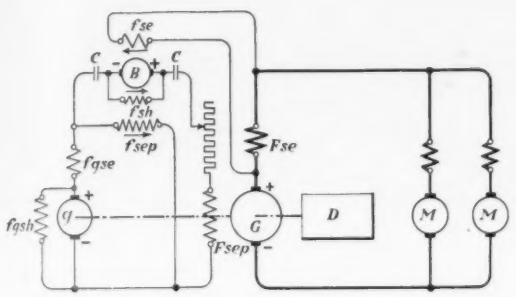



*Diagram of latest diesel locomotive, Japanese Government Railways*

*Right: 500 b.h.p. diesel engine built by the Niigata engine works*



*Below: Diagram of control system applied to the oil-electric locomotives of the Japanese Government Railways*




| | | | |
|---|---|---|---|
| *D* | Oil engine | *g* | Auxiliary generator |
| *G* | Main generator | *fse* | Booster separate series field |
| *M* | Traction motor | *fsh* | Booster self shunt field |
| *C* | Change-over switch of booster | *fsep* | Booster separate shunt field |
| *Fse* | Generator series field | *fgse* | Auxiliary generator series field |
| *Fsep* | Generator separate field | *fgsh* | Auxiliary generator shunt field |

on the South Manchuria Railway, and the later Japanese-built units for the same line. It is expected that further units to the new design will be built during the next few months.

Built by the Kawasaki Rolling Stock Company, the locomotives are of the AIA + AIA type, with a driving cab at each end. In order to gain adhesion weight the mechanical portion has been made very robust. The cab and underframe have been built up entirely by electric welding, and similar fabrication has been applied in part to the bogies. The two trucks carry the buffing and draw-gear and are connected together by an intermediate coupling designed by the State Railways. The wheels are 1·25 m. (49·3 in.) in diameter; leading dimensions of the locomotive are given in the accompanying diagram.

### Japanese-Built Engine

The underframe carries an eight-cylinder Niigata four-stroke engine which has a continuous rated capacity of 500 b.h.p. at 900 r.p.m., and a maximum peak output of 650 b.h.p. It is governed to run at a number of speeds between the idling rate of 450 r.p.m. and normal full speed. The cylinders have a bore and stroke of 250 mm. by 290 mm. (9·85 in. by 11·42 in.) respectively; the brake m.e.p. is 63·5 lb. per sq. in. and the piston speed 1,710 ft. per min. at the continuous rating. The cylinders, cylinder heads, and crankcase are of a low carbon nickel-chrome cast iron, and are encased in light metal covers. The pistons are of Nilex aluminium alloy.

Direct-coupled to the engine is a 300 kW. differentially-compounded self-ventilated main generator built by the Hitachi Electric Company. Engine and generator are mounted on a common welded steel bedplate. The generator has six main and six inter poles. The auxiliary generator is mounted on an extension of the main generator armature shaft, and has a capacity of 45 kW. at 900 r.p.m. The electric control system is of the type evolved by Mr. Yamashita, of the Japanese State Railways, and built by the Shibaura Engineering Company; it incorporates a boosting transformer and a hand controller. The main circuits are shown in one of the diagrams on this page.

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GANZ ENGINE IN FRANCE.—The first engine built by the Soc. Als-Thom under licence from Ganz, of Budapest, has been completed and subjected to independent tests. It develops an output of 330 b.h.p. at 1,300 r.p.m.

BRAZILIAN DIESELS.—The five Fiat railcars for the 5 ft. 3-in. gauge lines of the Central Railway of Brazil, the order for which we noted on p. 395 of our issue of September 4, are to be arranged as twin vehicles with an overall length of 100 ft. They will seat 80 passengers on a tare weight of approximately 44 tons, and will be arranged for a top speed of 85 km.p.h. (53 m.p.h.). Two Fiat oil engines aggregating 290 b.h.p. will be installed.

AMERICAN TRAIN COSTS.—According to a report of the Interstate Commerce Commission, the average cost of a streamlined three-car diesel-electric train in the U.S.A. is $231,639, the range being from $184,175 for each of the two *Rebel* trains of the Gulf, Mobile & Northern Railroad, to $276,336 for the stainless steel *Flying Yankee* of the Boston & Maine Railroad. The costs per foot run of train length were $955 and $1,652 respectively. The cost of the five-car *Green Diamond* train of the Illinois Central was about $400,000.

INTERNATIONAL RAILCAR SERVICE. — The 275 b.h.p. Ganz railcar of the Arpad type, belonging to the Hungarian State Railways, which has been working the Budapest-Vienna service for nearly two years, has been joined by an Austrian 420 b.h.p. diesel-electric railcar, which provides a complement to the Arpad service by leaving Vienna in the morning and returning from Budapest in the evening. The timing is somewhat slower, and stops are made at Bruck-Neudorf, Hegyeshalom, and Győr in each direction. Twelve of the 420 b.h.p. cars are now being delivered to the Austrian Federal Railways. The morning car from Vienna now hauls the through carriage from the Hook of Holland to Budapest. The Hungarian State Railways have just ordered two further Arpad cars from Ganz & Co.

# WHAT MAKES A GOOD LUBRICATING OIL?

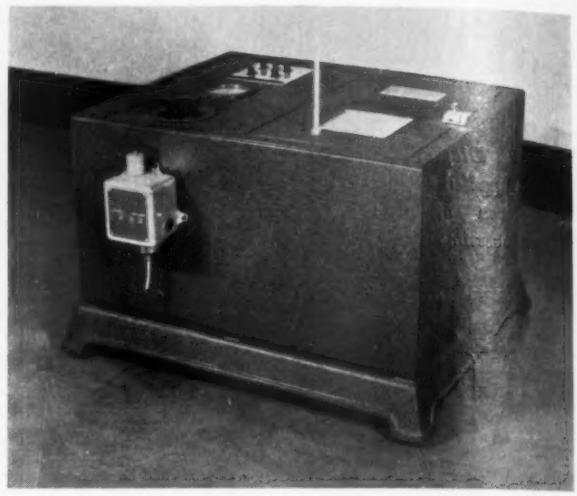
***The adhesive or "oiliness" properties and their measurement are discussed by a correspondent***

TO be a proper lubricant a substance must have, in addition to other properties, a strong affinity for the surface it is to lubricate. For this reason neither mercury nor glycerine are good lubricants, although they possess a high viscosity and flash point.

Two properties are paramount—viscosity and adhesion. Viscosity results from the cohesion between molecules, and is due to a field of force about individual molecules which binds them together. Adhesion is the ability of the molecules to stick to the shaft or bearing, and is due to the attractive force between the two. Lubricants which must withstand high stresses are best produced by a very small partial oxidation of oils. This oxidation produces small amounts of acids, &c., the molecules of which have a great affinity for metal surfaces. These act as a cement —perhaps only one molecule thick—which binds the rest of the lubricant to the shaft or bearing; the presence or absence of these may make or break a lubricant.

Oil is a good lubricant only if, in addition to certain other properties, it can be attracted powerfully to the material to be lubricated. In both extreme pressure and fluid film lubrication, adhesion is a dominant factor. Moreover, this adhesion, or oiliness, explains the performance disparity between two oils having the same viscosity at a given temperature. The characteristic properties and tests for a lubricating oil are shown in the genealogical chart accompanying this article.

The disparity between viscosity and adhesion is indicated by the accompanying diagram. Oil *A* is a Pennsylvania base and *B* is a Gulf Coast base; the viscosity of both is practically the same over a wide temperature range and actually coincides at 210° F. But the adhesion of these oils is seen to be widely different over the whole temperature range, the difference increasing rapidly with rising temperature. The Pennsylvania base oil has much higher adhesive properties, and in bearing tests it carried a load up to 2,800 lb. per sq. in. at 260° F., while the Gulf Coast base oil failed at 1,900 lb. per sq. in. at 200° F. Further, the viscosity of the Pennsylvania oil was lower where it failed at 260° F. than the other oil was at its point of failure. Tests such as these indicate that adhesion gives a truer reflex of the performance of a lubricant than does viscosity, without eliminating the necessity for the latter, and other features such as the flash point, to be given some consideration.

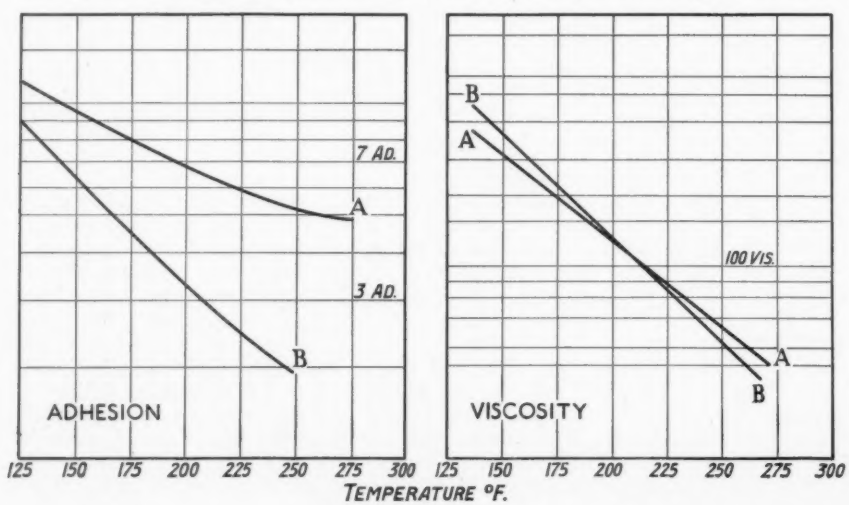


*Sperry-Cammens Adher-O-Scope, showing switches, tachometer, speed control, thermometer, observation window, and temperature control*

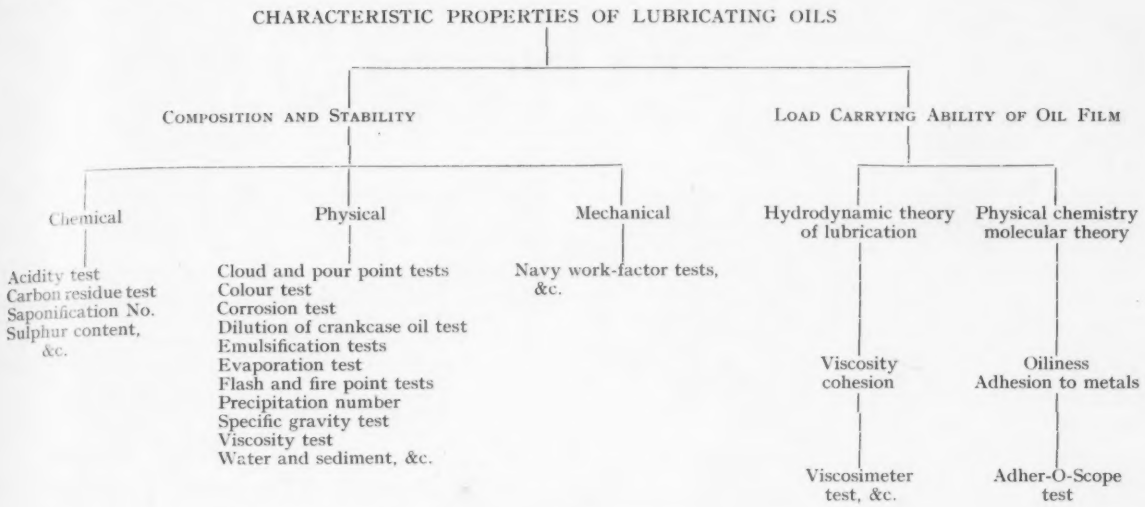
### A Measuring Machine

To enable the oiliness of any lubricant to be obtained quickly and the oiliness tests to be duplicated at will and without variable factors, the Sperry-Cammen Adher-O-Scope has been evolved, and it makes possible the selection of the best lubricants after questions of proper chemical stability and non-corrosiveness have been answered.

In the Sperry-Cammen Adher-O-Scope a thin film of oil on the periphery of a rapidly spinning rotor is subjected to a powerful disruptive effect by the centrifugal force. All particles of oil not held to the rotor by the adhesive properties are thrown off. Before the rotor is set in motion the test band encircling it is thoroughly cleaned and then weighed on an analytical balance. After proper dis-




*Graphs showing variation in viscosity and adhesive properties of lubricating oils from two different bases*




tribution of a predetermined weight of oil on its outer surface, the test band is again weighed. It is then put on the rotor and spun for 20 min. at testing speed, removed, and weighed again. The difference between the first and third weights gives the amount of oil still adhering to the band; the weights are taken in milligrammes.

### Two Critical Oil Speeds

By turning the rotor at a comparatively low speed, the centrifugal force tends to throw off the oil, but is opposed by two other forces, the adhesion of the oil to the rotor and the cohesion between the molecules of the oil. There is no definite relationship between viscosity and adhesion; an oil may be highly viscous without being adhesive, and *vice versa*. In a good lubricant the force of adhesion is materially greater than the force of cohesion, and the latter will be the first to be overcome by the centrifugal force. But as the force of cohesion is uniform throughout the oil mass, the instant the centrifugal force overcomes the cohesion all the oil clinging to the rotor by cohesion is thrown off, and there is an immediate and appreciable drop in weight at this first critical speed, which, of course, varies for each brand of oil.

As the speed of the rotor is further increased, some of the oil held on by adhesion begins to be thrown off. Unlike the oil held by cohesion, the oil *adhering* to the rotor consists more or less of a number of layers, each one molecule thick, and each held to the rotor by a force varying inversely as the square of its distance from the rotor face, and these layers are peeled off in the fashion of an onion skin as each yields to increasing centrifugal force with increase in speed.

For normal tests it is sufficient to obtain the adhesive, or oiliness, factor of the lubricant only at two critical speeds, the first, say, 1,000-1,500 r.p.m. with a standard Adher-O-Scope, at which the oil held by cohesion is thrown off; and the second, from 6,000 to 9,000 r.p.m. and occasionally up to 15,000 r.p.m., at which occurs a material drop in the amount of oil held by adhesion. This gives a definite indication as to the ability of an oil to cling to the surface being lubricated, and these tests have shown a close agreement with many series of service and exhaustive laboratory tests. Adhesion alone is not the one or the single final test of suitability, but from a number of oils selected for any given purpose, the adhesive power of each brand will be the determining factor in its lubrication value.

Interesting results obtained from a long and intensive research programme with the Adher-O-Scope were that a residuum has higher adhesive properties than a distillate from the same base; that super-refinement to gain a high viscosity index and chemical stability may reduce to an appreciable extent the power of adhesion; that the changes which occur through the use of oil improve their adhesive characteristics, but that usually this improvement is very short lived; and finally that additions of small percentages of " oily " compounds such as the more or less obsolete oleic acid or castor oil may improve the adhesion of the lubricant.

*View of Adher-O-scope, showing method of removing the test band from the rotor*

# NOTES AND NEWS

**Corsican Railcars.**—Several bogie railcars powered by 270-b.h.p. bogie-mounted M.A.N. engines have been delivered to the Corsican Railways. They are fitted with four-speed Minerva mechanical transmission.

**South African Diesels.**—According to the last annual report of the Railways and Harbours Board of South Africa, four 3-ft. 6-in. gauge diesel-electric locomotives were on order at a cost of £40,000.

**Alsace-Lorraine Cars.**—Five double-engined de Dietrich railcars have been purchased by the Alsace-Lorraine Railway, and are working from the Strasbourg and Mulhouse depots. They have two 160-b.h.p. Saurer engines and Mylius mechanical transmission.

**Ardelt Transmission.**—The German State Railway is to acquire some diesel railcars fitted with Ardelt mechanical transmission, and this gear is to be fitted also to a second double-engined diesel car (of 300 b.h.p.) on the Niederbarnimer Railway. It was described in the issue of this Supplement for February 21, 1936.

**Danish Diesel Mileage.**—During the fiscal year 1934-35, the 175 diesel railcars and locomotives belonging to the numerous private railways in Denmark covered an aggregate of 9,816,112 km. (6,100,000 miles), whereas the 275 steam locomotives covered only 3,114,515 km. (1,930,000 miles).

**Argentine Diesel Extension.**—As a result of the satisfaction given by the 34 Ganz diesel-mechanical railcars on the broad, standard, and narrow-gauge lines of the Argentine State Railways, permission is being sought from the Argentine Congress to spend $5,000,000 paper on the acquisition of 50 further diesel cars, with a view to replacing gradually the passenger steam trains on the Argentine Central Northern Railway.

**American Diesels.**—The Birmingham & Southern Railroad, which, as announced in the issue of this Supplement for October 2, was inquiring for 10 diesel-electric shunting locomotives, has divided its order equally between the American Locomotive Company and the Electro-Motive Corporation. The engine output of each make is to be 900 b.h.p. The American Locomotive Company also has received an order from the Universal Atlas Cement Company for a 600 b.h.p. oil-electric shunter.

**Dutch Diesels.**—Trials have been made recently with the 820 b.h.p. three-car trains of the Netherlands Railways between Utrecht and Groningen, and average end-to-end speeds in excess of 70 m.p.h. have been attained. The distance of 120·5 miles was covered in 95 min. exclusive of a 3 min. stop at Zwolle and 1 min. stops at Amersfoort and Assen. It is expected that a service with two or three of the three-car sets will begin on this line with the inauguration of the 1937 summer timetables.

**French State Railways Locomotive.**—Some four-wheeled diesel-electric shunting tractors have been set to work recently in yards of the French State Railways. They are powered by four-stroke four-cylinder Renault engines developing 160 b.h.p. at 1,000 r.p.m., and have Jeumont electric transmission, with series and series-parallel control. The two traction motors drive the axles through ordinary gears, and drive also an exciter, this being a necessary feature of the Jeumont system.

**Green Diamond Depreciation.**—Under a plan submitted by the Illinois Central, and approved by the Interstate Commerce Commission, the depreciation rate for the cars of the *Green Diamond* streamlined train (see issue of this Supplement for May 15) will be 8·14 per cent. annually, which allows for a life of approximately 12 years. The depreciation of the Union Pacific streamliners (see July 10 issue) will be calculated at rates ranging from 6·4 to 8·73 per cent.

**P.L.M. Railcars.**—At the end of September the P.L.M. Railway had in service 109 diesel and 30 petrol railcars, varying in power from 80 to 600 b.h.p. in the diesel range and from 240 to 800 b.h.p. in the petrol series. At the same time there were under construction 25 diesel and three petrol railcars. The daily kilometrage of the railcars in service is over 23,000 (14,400 miles), or 14 per cent. of the passenger train mileage for the whole P.L.M. system.

**S.L.M.-Winterthur Transmission.**—From the Swiss Locomotive Company we have received an interesting brochure giving logs of runs performed, both in regular and special service by the 290-b.h.p. diesel railcars of the Swiss Federal Railways. These cars were built by the Swiss Locomotive Company, and the torque of the Sulzer engine is transmitted to the wheels through the well-known S.L.M.-Winterthur oil-operated mechanical transmission. From this brochure we note that the S.L.M.-Winterthur transmission has been fitted to railway vehicles to an aggregate of 38,000 h.p.

**Danish Streamlined Trains.**—The four Frichs diesel-electric *Lyntog* streamlined trains of the Danish State Railways are being employed over three routes involving a daily kilometrage of 950, 900, and 570 respectively (588, 556, and 354 miles). They work in shifts, so that each train covers the same distance in a month. One or other of the train sets is always in reserve, and there are also one spare bogie complete with a double 250 b.h.p. engine and a driving bogie complete with traction motors. These bogies can be changed within a period of four hours, and if a defect occurs, a bogie can be changed overnight and repairs effected at leisure.

**Queensland Diesels.**—According to the report of the Queensland Commissioner of Railways, the satisfactory results of an experimental diesel engine for railcars led, in the fiscal year 1935-36, to the purchase of four Gardner 102 b.h.p. 6LW engines, and two rail motor trains fitted with these units were set to work, and have since been followed by another. All were built at the Ipswich shops. The last two sets are fitted with VSG hydraulic torque converter transmission. All axlebox bearings are of the roller type. The Commissioner's report says that the rail motor trains continue to be popular because of the speedy, clean and comfortable services they provide.

**The Denver Zephyrs.**—The two power cars of each of these 12-coach trains, whose record run was dealt with in our issue of October 30, are at one end of the train. The first unit houses two 900 b.h.p. Winton engines within an overall length of 56 ft. 9 in. and a weight of 99 Engl. tons; the second contains one 1,200 b.h.p. Winton engine within a length of 55 ft. and a weight of 92·5 Engl. tons. The overall length of the complete train is 883 ft. 9 in., and the weight ready for service, but without passengers or luggage, 564 Engl. tons. A train contains 102 coach seats, 93 upper and lower berths, 10 parlour car seats, 104 lounge and dining-car seats, and 31 additional seats in the men's and women's dressing rooms. The crew's quarters have bunks for 12 persons. The ten passenger cars are divided into six units, some articulated and some single.